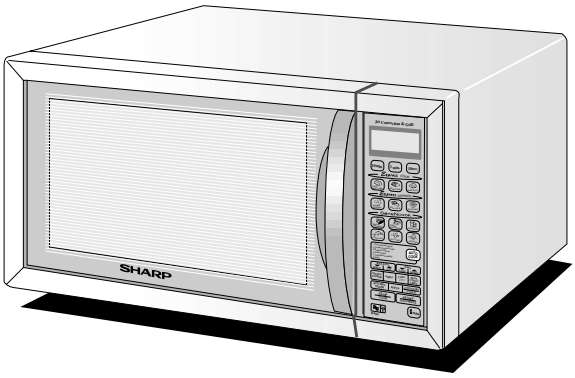
SHARP® SERVICE MANUAL

S0601R963EW//



MICROWAVE OVEN WITH GRILL AND CONVECTION

MODELS **R-953(SL)M**
R-953(W)M
R-963(SL)M
R-963(W)M

In interests of user-safety the oven should be restored to its original condition and only parts identical to those specified should be used.

TABLE OF CONTENTS

	Page
SERVICING	INSIDE COVER
CAUTION, MICROWAVE RADIATION	1
WARNING	1
PRODUCT SPECIFICATIONS	2
GENERAL INFORMATION	2
APPEARANCE VIEW	3
OPERATION SEQUENCE	4
FUNCTION OF IMPORTANT COMPONENTS	8
TROUBLESHOOTING GUIDE	11
TEST PROCEDURE	12
TOUCH CONTROL PANEL ASSEMBLY	19
COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE	25
MICROWAVE MEASUREMENT	31
SCHEMATIC DIAGRAMS	32
PICTORIAL DIAGRAM	36
POWER UNIT CIRCUIT	37
CPU UNIT CIRCUIT	38
INDICATOR CIRCUIT	40
KEY UNIT CIRCUIT	41
PRINTED WIRING BOARD	43
PARTS LIST	44
EXPLODED DIAGRAM OF OVEN	47
CONTROL PANEL/DOOR PARTS	48
MISCELLANEOUS/PACKING & ACCESSORIES	49

SHARP CORPORATION

SERVICING

WARNING TO SERVICE PERSONNEL

Microwave ovens contain circuitry capable of producing very high voltage and current, contact with following parts will result in electrocution.
High voltage capacitor, High voltage transformer, Magnetron, High voltage rectifier assembly, High voltage harness.

REMEMBER TO CHECK 3D

1) Disconnect the supply.
2) Door opened, and wedged open.
3) Discharge high voltage capacitor.

WARNING: AGAINST THE CHARGE OF THE HIGH-VOLTAGE CAPACITOR

The high-voltage capacitor remains charged about 60 seconds after the oven has been switched off. Wait for 60 seconds and then short-circuit the connection of the high-voltage capacitor (that is, of the connecting lead of the high-voltage rectifier) against the chassis with the use of an insulated screwdriver.

Sharp recommend that wherever possible fault-finding is carried out with the supply disconnected. It may in, some cases, be necessary to connect the supply after the outer case has been removed, in this event carry out 3D checks and then disconnect the leads to the primary of the High voltage transformer. Ensure that these leads remain isolated from other components and the oven chassis. (Use insulation tape if necessary.) When the testing is completed carry out 3D checks and reconnect the leads to the primary of the High voltage transformer.

REMEMBER TO CHECK 4R

1) Reconnect all leads removed from components during testing.
2) Replace the outer case (cabinet).
3) Reconnect the supply.
4) Run the oven. Check all functions.

Microwave ovens should not be run empty. To test for the presence of microwave energy within a cavity, place a cup of cold water on the oven turntable, close the door and set the power to HIGH and set the microwave timer for two (2) minutes. When the two minutes has elapsed (timer at zero) carefully check that the water is now hot. If the water remains cold carry out 3D checks and re-examine the connections to the component being tested.

When all service work is completed, and the oven is fully assembled, the microwave power output should be checked and a microwave leakage test should be carried out.

SERVICE MANUAL

SHARP

MICROWAVE OVEN WITH GRILL AND CONVECTION

R-953(SL)M/ R-953(W)M/ R-963(SL)M/ R-963(W)M

GENERAL IMPORTANT INFORMATION

This Manual has been prepared to provide Sharp Corp. Service engineers with Operation and Service Information.

It is recommended that service engineers carefully study the entire text of this manual, so they will be qualified to render satisfactory customer service.

WARNING
MICROWAVE RADIATION

Personnel should not be exposed to the microwave energy which may radiate from the magnetron or other microwave generating devices if it is improperly used or connected. All input and output microwave connections, waveguides, flanges and gaskets must be secured. Never operate the device without a microwave energy absorbing load attached. Never look into an open waveguide or antenna while the device is energized.

WARNING

Never operate the oven until the following points are ensured.
(A) The door is tightly closed.
(B) The door brackets and hinges are not defective.
(C) The door packing is not damaged.
(D) The door is not deformed or warped.
(E) There is not any other visible damage with the oven.

Servicing and repair work must be carried out only by trained service engineers.

All the parts marked "*" on parts list are used at voltages more than 250V.

Removal of the outer wrap gives access to potentials above 250V.

All the parts marked "Δ" on parts list may cause undue microwave exposure, by themselves, or when they are damaged, loosened or removed.

Never operate the Grill and/ or Convection heater with the oven outer cabinet removed. (Because air flow is eliminated, and the excess heat generated on adjacent components). **It can cause permanent damage or a fire.**

SHARP CORPORATION

OSAKA, JAPAN

PRODUCT SPECIFICATIONS
GENERAL INFORMATION
APPEARANCE VIEW
OPERATING SEQUENCE
FUNCTION OF IMPORTANT COMPONENTS
TROUBLESHOOTING GUIDE AND TEST PROCEDURE
TOUCH CONTROL PANEL
COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE
MICROWAVE MEASUREMENT
WIRING DIAGRAM
PARTS LIST

PRODUCT DESCRIPTION

SPECIFICATION

ITEM	DESCRIPTION
Power Requirements	230 - 240 Volts / 50 Hertz / Single phase, 3 wire earthed
Power Consumption	Microwave cooking 1.55 kW Approx. 6.7 A
	Convection cooking 2.85 kW Approx. 11.9 A
	Grill cooking 2.85 kW Approx. 11.9 A
	Dual cooking Micro and Grill ..... 2.95 kW Approx. 12.6 A Micro and Convection ..... 2.95 kW Approx. 12.6 A
Power Output	900 W nominal of RF microwave energy (measured by method of IEC 60705) Operating fequency 2450 MHz
Grill heating element Power Output	1400 W
Convection heating element Power Output	1400 W
Case Dimensions	Width 550 mm Height 368 mm (including foot) Depth 537 mm
Cooking Cavity Dimensions	Width 375 mm Height 272 mm Depth 395 mm
Turntable diameter	362mm
Control Complement	Touch Control System Clock (1:00 - 12:59) / Timer (0 - 99 minutes 90 sec.) Microwave Power for Variable Cooking Repetition Rate; 100 % (HIGH) ..... Full power throughout the cooking time 70 % (MEDIUM HIGH) ..... approx. 70% of FULL Power 50 % (MEDIUM) ..... approx. 50% of FULL Power 30 % (MEDIUM LOW) ..... approx. 30% of FULL Power 10 % (LOW) ..... approx. 10% of FULL Power Convection temperature control range: 250˚C, 230˚C, 220˚C, 200˚C, 180˚C, 160˚C, 130˚C, 100˚C, 70˚C and 40˚C TIME keys, EXPRESS COOK keys, EXPRESS DEFROST keys SENS' N' COOK key (R-963M only), AUTO COOK key LESS/MORE keys, CONVECTION key, DUAL CONVECTION/GRILL key WEIGHT CONVERSION key, AUTO START/CLOCK key START/AUTO MINUTE key, INFO key, STOP/CLEAR key, KITCHEN TIMER key, MICROWAVE POWER LEVEL key GRILL key, WEIGHT keys
Set Weight	Approx. 29 kg

As part of our policy of continuous improvement, we reserve the right to alter design and specifications without notice

GENERAL INFORMATION

WARNING

THIS APPLIANCE MUST BE EARTHED

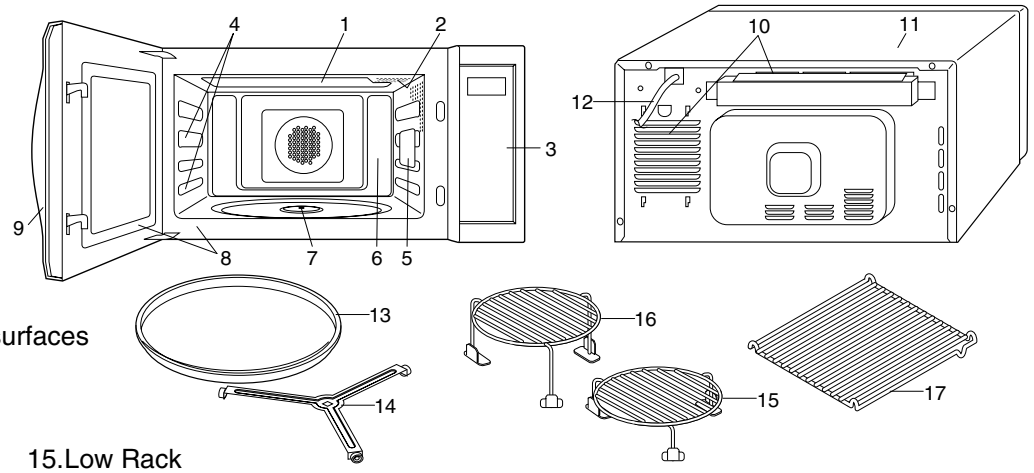
IMPORTANT

THE WIRES IN THIS MAINS LEAD ARE COLOURED IN ACCORDANCE WITH THE FOLLOWING CODE:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

APPEARANCE VIEW

OVEN



1. Grill heating element
2. Oven lamp
3. Control panel
4. Shelf runners
5. Waveguide cover
6. Oven cavity
7. Coupling
8. Door seals and sealing surfaces
9. Door opening handle
10. Air-vent openings
11. Outer cabinet
12. Power cord
13. Turntable
14. Turntable support
15. Low Rack
16. High Rack
17. Square shelves (x2)

DIGITAL DISPLAY:

Note for R-963M: When **i** is highlighted in the display, press the **INFO** key to read a specific hint which may assist you.

1. **COOK** indicator
2. **GRILL** indicator
3. **CONVECTION** indicator
4. **MICROWAVE** indicator
5. **INFO** indicator (R-963M only)

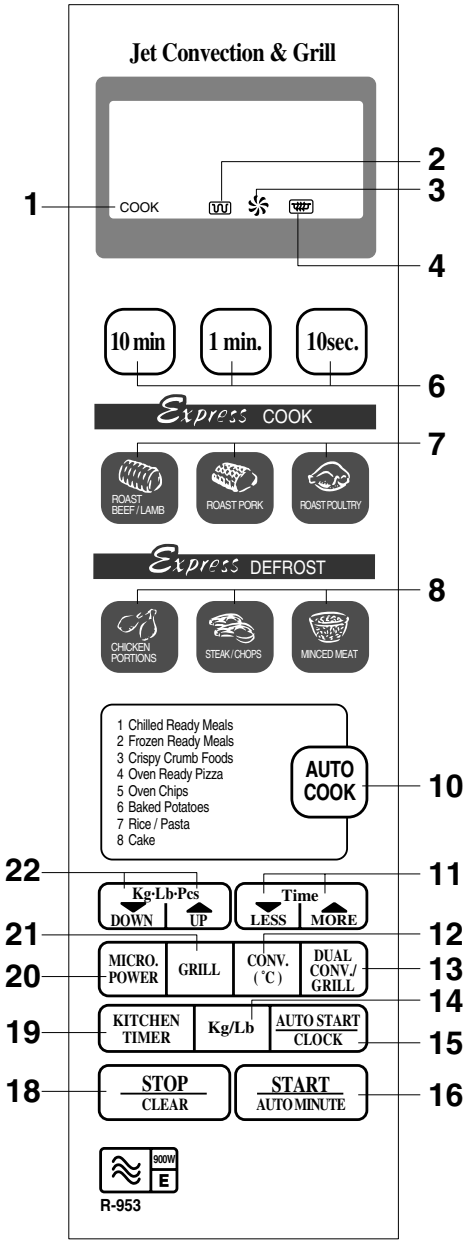
CONTROL PANEL:

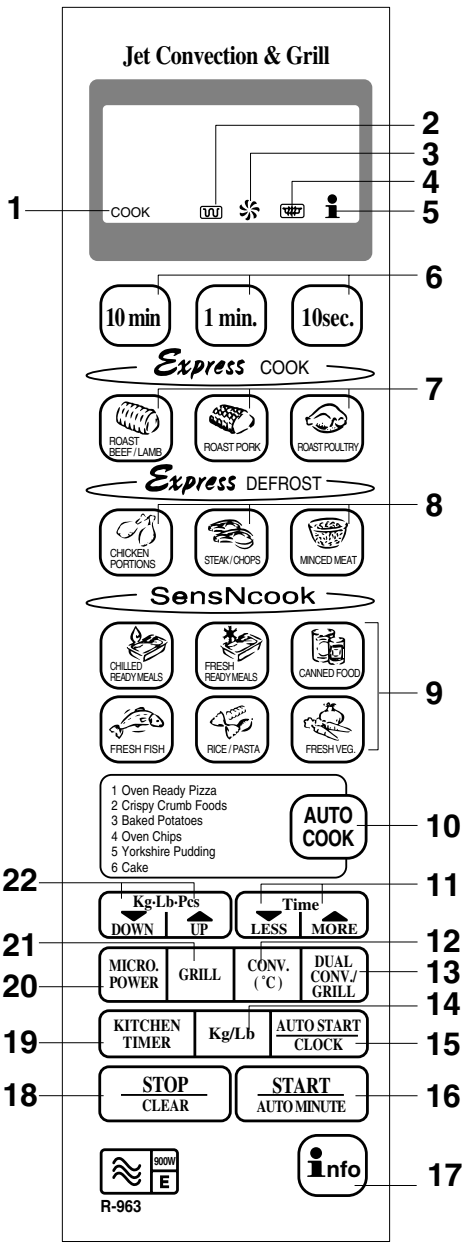
6. **TIME** keys
7. **EXPRESS COOK** key
8. **EXPRESS DEFROST** key
9. **SENS' N' COOK** key (R-963M only) See NOTE.
10. **AUTO COOK** key
11. **LESS/MORE** keys
    Press to shorten or lengthen cooking/ defrosting time.
12. **CONVECTION** key
13. **DUAL CONVECTION/GRILL** key
14. **WEIGHT CONVERSION** key
15. **AUTO START/CLOCK** key
16. **START/AUTO MINUTE** key (See NOTE.)
17. **INFO** key (R-963M only)
18. **STOP/CLEAR** key
19. **KITCHEN TIMER** key
20. **MICROWAVE POWER LEVEL** key
21. **GRILL** key
22. **WEIGHT** keys

NOTE:

The directed features are disabled after three minutes when the oven is not in use. These features are automatically enabled when the door is opened and closed or the STOP/ CLEAR pad is pressed.

CONTROL PANEL





OPERATION SEQUENCE

OFF CONDITION

Closing the door activates the monitored latch switch and the stop switch.

IMPORTANT:

When the oven door is closed, the contacts COM-NC of the monitor switch must be open. When the microwave oven is plugged in a wall outlet (230 - 240V / 50Hz), the line voltage is supplied to the noise filter.

Figure O-1 on page 32

1. The control unit is not energized. The display shows nothing (Fig. O-1 (a)).
2. Open the door. The contacts (COM-NC) of the monitored latch switch are closed and the control unit is energized. Then contacts of relays RY1 and RY5 are closed, and the oven lamp will light and the display will show "ENERGY SAVE MODE" (Fig. O-1(b)).
3. Close the door. The contacts (COM-NC) of the monitored latch switch are opened and the contacts of relay RY1 are opened and the oven lamp will be turned off. The display will show " . 0". (Fig. O-1(c)).

NOTE: Energy save mode

1. If the oven has not been used for more than 3 minutes, the contacts of the relay RY5 will be opened and the control unit will be not energized. Open and close the door, the control unit will resume.
2. If the clock is set, this energy save mode does not work.
3. If the display shows different messages from **ENERGY SAVE MODE,** the oven may be set in demo mode. Close the door, see operation manual to cancel demo mode.

MICROWAVE COOKING CONDITION

HIGH COOKING

Enter a desired cooking time by touching the TIME keys and start the oven by touching START key.

Function sequence Figure O-2 on page 33

CONNECTED COMPONENTS	RELAY
Oven lamp, Turntable motor	RY1
High voltage transformer	RY2
Fan motor	RY6

1. The line voltage is supplied to the primary winding of the high voltage transformer. The voltage is converted to about 3.3 volts A.C. output on the filament winding and high voltage of approximately 2000 volts A.C. on the secondary winding.
2. The filament winding voltage (3.3 volts) heats the magnetron filament and the high voltage (2000 volts) is sent to the voltage doubling circuit, where it is doubled to negative voltage of approximately 4000 volts D.C..
3. The 2450 MHz microwave energy produced in the magnetron generates a wavelength of 12.24 cm. This energy is channelled through the waveguide (transport channel) into the oven cavity, where the food is placed to be cooked.
4. When the cooking time is up, a signal tone is heard and the relays RY1 + RY2 + RY6 go back to their home position. The circuits to the oven lamp, high voltage transformer, fan motor and turntable motor are cut off.
5. When the oven door is opened during a cooking cycle, the switches come to the following condition.

Switch	Contact	Condition	
		During Cooking	Oven Door Open(No cooking)
Monitored latch switch	COM-NO	Closed	Opened
	COM-NC	Opened	Closed
Stop switch	COM-NO	Closed	Opened
Monitor Switch	COM-NO	Closed	Opened
	COM-NC	Opened	Closed

The circuit to the high voltage transformer is cut off when the contacts of relay RY2, and the contacts (COM-NO) of the monitored latch switch and monitor switch are made open. The circuit to the fan motor is cut off when the relay RY6 is made open. The circuit to the turntable motor is cut off when the contacts (COM-NO) of the monitored latch switch are made open. The oven lamp remains on even if the oven door is opened after the cooking cycle has been interrupted, because the relay RY1 stays closed. Shown in the display is remaining time.

6. MONITOR SWITCH CIRCUIT
   The monitor switch is mechanically controlled by the oven door, and monitors the operation of the monitored latch switch.

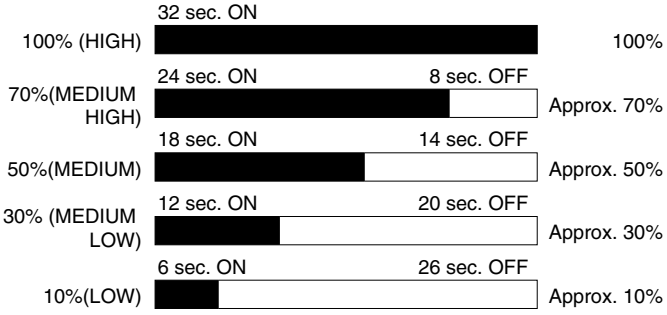
6-1. When the oven door is opened during or after the cycle of a cooking program, the monitored latch switch and stop switch must open their contacts (COM-NO) first. And the contacts (COM-NC) of the monitored latch switch are made closed. After that the contacts (COM-NC) of the monitor switch can be closed and the contacts (COM-NO) of monitor switch are made open.

6-2. When the oven door is closed, the contacts (COM-NC) of the monitor switch SW3 must be opened and the contacts (COM-NO) of monitor switch must be closed. After that the contacts (COM-NO) of the monitored latch switch and the stop switch are made closed. And the contacts (COM-NC) of the monitored latch switch are made open.

6-3. When the oven door is opened and the contacts (COM-NO) of the monitored latch switch remain closed, the fuse F8A will blow. Because the relay RY1 and monitor switch are closed and a short circuit is caused.

MEDIUM HIGH, MEDIUM, MEDIUM LOW, LOW COOKING

When the microwave oven is preset for variable cooking power, the line voltage is supplied to the high voltage transformer intermittently within a 32-second time base through the relay contact which is coupled with the current-limiting relay RY2. The following levels of microwave power are given.



OPERATION SEQUENCE

Note: The On/Off time ratio does not exactly correspond to the percentage of microwave power, because approx. 3 seconds are needed for heating up the magnetron filament.

GRILL COOKING CONDITION

TOP GRILL (Figure O-3a)

In this condition the food is cooked by the grill heating element . Programme the desired cooking time by touching the TIME keys and touch the GRILL key once. When the START key is touched, the following operations occur:

1. The numbers on the digital read-out start the count down to zero.
2. The oven lamp, cooling fan motor and turntable motor are energized.
3. The relay RY3 is energized and the main supply voltage is applied to the top grill heating elements.
4. Now, the food is cooked by the top grill heating elements.

NOTE: The convection cooking condition will be curried out simultaneously until the temperature of the oven cavity rise to 220˚C.

CONVECTION COOKING CONDITION (Figure O-4)

PRE-HEATING (by 40˚C - 130˚C)

Programme the desired convection temperature of 40˚C - 130˚C by touching CONVECTION key. When the START key is touched, the following operations occur:

1. The relays RY1, RY6 and RY7 are energized, the oven lamp, turntable motor, fan motor and convection motor are turned on.
2. The relay RY4 is energized and the main supply voltage is applied to the convection heating element.
3. After the temperature of oven cavity rises to the selected one, the oven will continue to turned the convection heating element on and off to maintain the temperature for 30 minutes.

PRE-HEATING (by 160˚C – 250˚C)

Programme the desired convection temperature of 160˚C - 250˚C by touching CONVECTION key. When the START key is touched, the following operations occur:

1. The relays RY1, RY6 and RY7 are energized, the oven lamp, turntable motor, fan motor and convection motor are turned on.
2. The relay RY4 and RY3 are is energized and the main supply voltage is applied to the convection heating element and the grill heating elements.
3. After the temperature of oven cavity rises to the selected one, the oven will continue to turned the convection heating element on and off to maintain the temperature for 30 minutes. And simultaneously the grill heating element will be operated at 10% power output.

CONVECTION COOKING (by 250˚C)

Programme the cooking time by touching TIME keys. And then programme the convection temperature of 250˚C by touching CONVECTION key. When the START key is touched, the following operations occur:

1. The relays RY1, RY6 and RY7 are energized, the oven lamp, turntable motor, fan motor and convection motor are turned on.
2. The relay RY4 and RY3 are energized and the main supply voltage is applied to the convection heating element and the grill heating element.
3. The oven will continue to turned the convection heating element on and off to maintain the temperature for the programmed cooking time. And simultaneously the grill heating elements will be operated at 10% power output.

CONVECTION COOKING (by 40˚C – 230˚C)

Programme the cooking time by touching TIME keys. And then programme the desired convection temperature of 40˚C 230˚C by touching CONVECTION key. When the START key is touched, the following operations occur:

1. The relays RY1, RY6 and RY7 are energized, the oven lamp, turntable motor, fan motor and convection motor are turned on.
2. The relay RY4 is energized and the main supply voltage is applied to the convection heating element.
3. The oven will continue to turned the convection heating element on and off to maintain the temperature for the programmed cooking time.

DUAL COOKING CONDITION

MICROWAVE AND CONVECTION (Figure O-5a)

Programme the desired cooking time by touching the TIME keys. Touch the DUAL CONV./GRILL key once. Select the microwave power level by touching the MICROWAVE POWER LEVEL key. And select the convection temperature by touching the CONVECTION key.

NOTE: The 100% microwave power level can not be selected.

When the START key is touched, the following operations occur:

1. The numbers on the digital read-out start the count down to zero.
2. The oven lamp, fan motor, turntable motor and convection motor are energized.
3. The relay RY4 will be energized and the main supply voltage is applied to the convection heating element.
4. The relay RY2 is energized and the microwave energy is generated by magnetron.
5. Now, the food is cooked by microwave and convection energy simultaneously.

MICROWAVE AND TOP GRILL (Figure O-5b)

Programme the desired cooking time by touching the TIME keys. Touch the DUAL CONV./GRILL key twice. Select the microwave power level by touching the MICROWAVE POWER LEVEL key. When the START key is touched, the following operations occur:

1. The numbers on the digital read-out start the count down to zero.
2. The oven lamp, fan motor and turntable motor are energized.
3. The relay RY3 is energized and the main supply voltage is applied to the grill heating elements.
4. The relay RY2 is energized and the microwave energy is generated by magnetron.
5. Now, the food is cooked by microwave and grill simultaneously.

OPERATION SEQUENCE

ON/OFF TIME RATIO

In grill cooking, convection cooking or dual cooking, the grill heating elements or magnetron operate within a 48 second time base. The following table is the ON / OFF time ratio at each power output of the grill heating element or magnetron.

POWER OUTPUT	ON TIME	OFF TIME
100%	48 sec.	0 sec.
90%	44 sec.	4 sec.
80%	40 sec.	8 sec.
70%	36 sec.	12 sec.
60%	32 sec.	16 sec.
50%	26 sec.	22 sec.
40%	22 sec.	26 sec.
30%	16 sec.	32 sec.
20%	12 sec.	36 sec.
10%	8 sec.	40 sec.

AUTOMATIC COOKING

Auto Cook functions automatically work out the correct cooking mode and cooking time and/or cooking temperature. They will cook according to the special cooking sequence.

POWER OUTPUT REDUCTION

After the same cooking mode is carried out for more than the basis cooking time, the power output is automatically reduced by turning the control relays on and off intermittently, as shown in the table below. This is to protect the oven door against temperature rising.

Cooking mode		Basis cooking time (minutes)	Reduced power output (%)	Time base (seconds)
Microwave (100%)		20	70	32
Grill		15	70	48
Convection		Not reduction		
Micro. (70%)		40 (Micro.)	50	48
+ Grill		15 (Grill)	50	48
DUAL	Micro. (100%)	15 (Micro.)	50	48
	+ Grill	15 (Grill)	50	48
	Micro. (70%)	40 (Micro.)	50	48
	+ Conv.	Not reduction		

NOTE:

1. If the multiple sequence cooking is carried out in the same mode, the basis cooking time is calculated from the first.
2. Even if the cooking is stopped by the STOP key or opening the door, the basis cooking time is calculated from the first.
3. If the same cooking mode is repeated within 1 minute and 15 seconds, the basis cooking time is calculated from the first.
4. If the same manu of AUTO COOK is repeated within 1 minute and 15 seconds, the power output of the microwave or the grill will be reduced to 70% after 20 minutes when the oven is started at first.

FAN MOTOR OPERATION (in Grill, Convection and Dual mode)

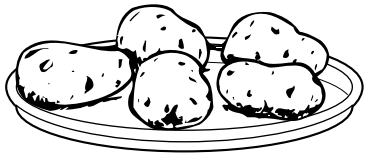
When oven is stopped during cooking, or after the cooking is completed, the fan motor will operate if the oven cavity temperature is above 120˚C, and the fan motor will stop if the oven cavity temperature is below 105˚C.

CONVECTION MOTOR OPERATION

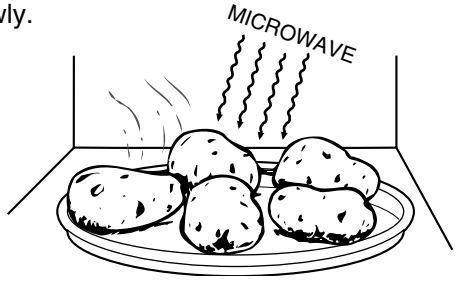
If the temperature of oven cavity is higher than 120˚C after and when operated by 250˚C convection cooking, 250˚C dual convection cooking or 250˚C preheating, the convection motor will operate for maximum 1 minute until the oven cavity temperature drops below 105˚C.

ABSOLUTE HUMIDITY SENSOR (AH SENSOR) COOKING CONDITION

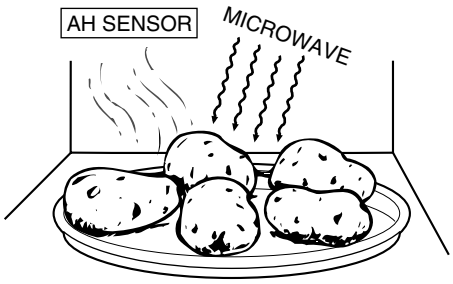
When the AH sensor is used, the foods are cooked in microwave cooking mode without figuring time, power level or quantity. When the oven senses enough steam from the food, it relays the information to its microprocessor which will calculate the remaining cooking time and power level needed for best results.
When the food is cooked, water vapour is developed. The sensor “senses” the vapour and its resistance increases gradually. When the resistance reaches the value set according to the menu, supplementary cooking is started. The time of supplementary cooking is determined by experiment with each food category and inputted into the LSI.
An example of how sensor works:



1. Potatoes at room temperature. Vapour is emitted very slowly.



2. Heat potatoes. Moisture and humidity is emitted rapidly. You can smell the aroma as it cooks. ;



3. Sensor detects moisture and humidity and calculates cooking time and variable power.

OPERATION SEQUENCE

AH SENSOR COOKING SEQUENCE

1. When the AH sensor cooking condition is started, the coil of shut-off relays (RY1+RY6) are energized, the oven lamp and cooling fan motor are turned on, but the power transformer is not turned on.

NOTE: The oven should not be operated on AH SENSOR COOKING immediately after plugging in the unit. Wait two minutes before cooking on AH SENSOR COOKING CONDITION.

2. After about 16 seconds, the cook relay (RY2) is energized. The power transformer is turned on, microwave energy is produced and first stage is started. The 16 seconds is the cooling time required to remove any vapour from the oven cavity and sensor. (Figure O-2)

NOTE: During this first stage, do not open the door or touch STOP/CLEAR pad.

3. When the sensor detects the vapour emitted from the food, the display switches over to the remaining cooking time and the timer counts down to zero.
   At this time, the door may be opened to stir food, turn it or season, etc.

NOTE: In case where a small quantity of food is cooked, the oven will stop without displaying the remaining cooking time.

4. When the timer reaches zero, an audible signal sounds. The shut-off relay (RY1+RY6) and cook relay (RY2) are de-energized and the power transformer, oven lamp, etc. are turned off.
5. Operating the door or touching the STOP/CLEAR pad, the time of day will reappears on the display and the oven will revert to an OFF condition.

FUNCTION OF IMPORTANT COMPONENTS

DOOR OPEN MECHANISM

The door can be opened by pushing the open button on the control panel. When the open button is pushed, the open lever is pushes lower latch head on the door upward. The upper latch head is linked with the lower latch head, so now, the door can be opened.

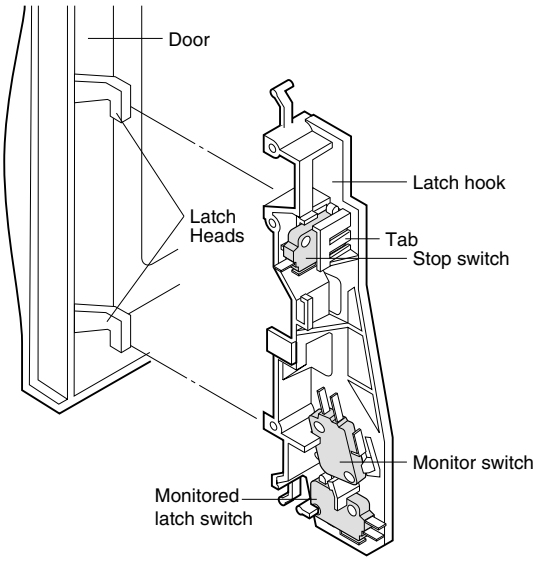


Figure D-1. Door Open Mechanism

MONITORED LATCH SWITCH

1. When the oven door is closed, the contacts (COM-NO) of the switch must be closed. And the contacts (COM-NC) must be opened.
2. When the oven door is opened, the contacts (COM-NO) of the switch must be opened. And the contacts (COM-NC) must be closed.

STOP SWITCH

1. When the oven door is closed, the contacts (COM-NO) of the switch must be closed.
2. When the oven door is opened, the contacts (COM-NO) of switch must be opened.

MONITOR SWITCH

The monitor switch is activated (the contacts opened) by the upper latch head on the door while the door is closed. The switch is intended to render the oven inoperative by means of blowing the fuse F8A when the contacts of the monitored latch switch fail to open when the door is opened.

Function

1. When the door is opened, the contacts (COM-NC) of monitor switch close (to the ON condition) due to their being normally closed and contacts (COM-NO) open. At this time the contacts (COM-NO) of monitored latch switch is in the OFF condition (contacts open) due to their being normally open contact switches.
2. As the door goes to a closed position, the monitor switch contacts (COM-NC) are opened and contacts (COM-NO) closed and then contacts (COM-NO) of monitored latch switch and stop switch are closed. (On opening the door, each of these switches operate inversely.)
3. If the door is opened and the monitored latch switch contacts (COM-NO) fail to open, the fuse F8A blows immediately after closing of the monitor switch (COM-NC) contacts.

CAUTION: BEFORE REPLACING A BLOWN FUSE F8A, TEST THE MONITORED LATCH SWITCH AND MONITOR SWITCH FOR PROPER OPERATION. (REFER TO CHAPTER "TEST PROCEDURE").

FUSE 20A 250V

If the wire harness or electrical components are short-circuited, this fuse 20A blows to prevent an electric shock or fire hazard.

FUSE F8AH 250V

1. If the wire harness or electrical components are short-circuited, this fuse blows to prevent an electric shock or fire hazard.
2. The fuse also blows when the monitored latch switch remains closed with the oven door open and when the monitor switch contact (COM-NC) closes.
3. The fuse also blows when the asymmetric rectifier, H.V. rectifier,. H.V. wire harness, H.V. capacitor, magnetron or secondary winding of high voltage transformer is shorted.

TC TRANSFORMER

T/C transformer converts A.C. line voltage into low voltage to drive the control unit.

THERMAL CUT-OUT 125˚C (MG)

This thermal cut-out protects the magnetron against overheat. If the temperature goes up higher than 125˚C because the fan motor is interrupted or the ventilation openings are blocked, the thermal cut-out will open and switch off all the electrical parts. The defective thermal cut-out must be replaced with a new one.

THERMAL CUT-OUT 170˚C (GRILL)

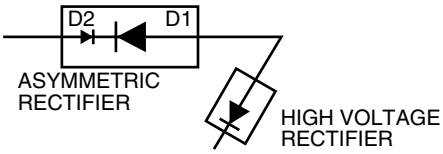
This thermal cut-out protects the oven against the overheat during grill cooking, convection cooking or dual cooking. If the temperature rises above 170˚C because the fan motor is interrupted, the air inlet duct is blocked or the ventilation openings are obstructed, the thermal cut-out opens and switches off all the electrical parts. When the cools itself down to the operating temperature of 155˚C, the contacts of the thermal cut-out will close again.

THERMAL CUT-OUT 170˚C (CONV.)

This thermal cut-out protects the convection motor against the overheat. If the temperature of the thermal cut-out rises above 170˚C because the convection fan is interrupted, the ventilation openings are obstructed or the other abnormal matter occurs, the thermal cut-out opens and switches off the convection heating element and the other electrical parts. When the cools itself down to the operating temperature of 155˚C, the contacts of the thermal cut-out will close again.

ASYMMETRIC RECTIFIER

The asymmetric rectifier is solid state device that prevents current flow is both directions. And it prevents the temperature rise of the high voltage transformer by blowing the fuse F8A when the high voltage rectifier is shorted.



The rated peak reverse voltage of D1 of the asymmetric rectifier is 6 KV. The rated peak reverse voltage of D2 of the asymmetric rectifier is 1.7 KV. D1 and D2 of the asymmetric rectifier or high voltage rectifier are shorted when the each peak reverse voltage goes beyond the each rated peak reverse voltage. (The process of the blowing the fuse F8A.)

1. The high voltage rectifier is shorted by some fault when microwave cooking or dual cooking.
2. The peak reverse voltage of D2 of the rectifier goes beyond the rated peak reverse voltage 1.7 KV in the voltage doubler circuit.
3. D2 of the rectifier is shorted.
4. The large electric currents flow through the high voltage winding of the high voltage transformer.
5. The large electric currents beyond 8A flow through the primary winding of the high voltage transformer.
6. The fuse F8A blows by the large electric currents.
7. The power supplying to the high voltage transformer is cut off.

NOISE FILTER

The noise filter assembly prevents radio frequency interference that might flow back in the power circuit.

TURNTABLE MOTOR

The turntable motor rotates the turntable.

FAN MOTOR

The fan motor drives a blade which draws external cool air. This cool air is directed through the air vanes surrounding the magnetron and cools the magnetron. This air is channelled through the oven cavity to remove steam and vapours given off from heating food. It is then exhausted through the exhausting air vents of the oven cavity.

CONVECTION MOTOR

The convection motor drives the convection fan and provides the heated air.

GRILL HEATING ELEMENT

The grill heating elements are provided to brown the food and are located on the top of the oven cavity.

CONVECTION HEATING ELEMENT

The convection heating element escalated at the rear of the oven cavity. It is intended to heat air driven by the convection fan. The heated air is kept in the oven and force-circulated and reheated by the convection heating element.

CONVECTION COOKING SYSTEM

This oven is designed with a hot air heating system where food is heated by forced circulation of the hot air produced by the grill heaters. The air heated by the grill heating elements is circulated through the convection passage provided on the outer casing of the oven cavity by means of the convection fan which is driven by the convection motor. It is then enters the inside of the oven through the vent holes provided on the back side of the oven. Next, the hot air heats the food on the turntable and leaves the oven cavity through the vent in the oven cavity rear wall. In this way, the hot air circulates inside the oven cavity to raise its temperature and, at the same time, comes into contact with the food being cooked. When the temperature inside the oven cavity reaches the selected temperature, the heating elements are de-energized. When the temperature inside the oven cavity drops below the selected temperature, the heating elements are energized again. In this way, the inside of the oven cavity is maintained at approximately the selected temperature. When the convection time reaches “0”, the heating elements are de-energized and the convection fan stops operating and the oven shuts off. At that time if the cavity air temperature has raisen above 120˚C, the fan motor remains rotating. Automatically the fan motor will be shut down at low temperature (less than 105˚C).

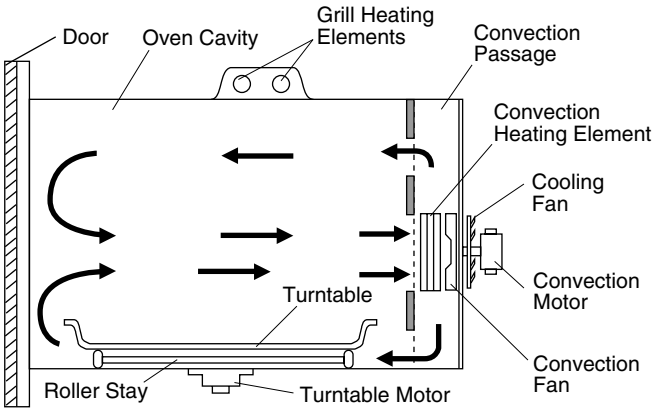
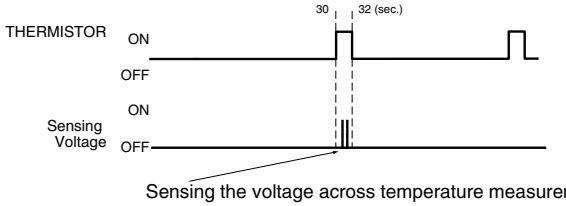


Figure D-2. Convection Cooking System

FIRE SENSING FEATURE

The oven will stop its operation when there is a fire in the oven cavity in microwave cooking condition.
LSI measures the voltage across the temperature measurement circuit intermittently within 32-seconds time base since the oven is started in microwave cooking condition. The oven will stop its operation when the difference of the voltage is more than 0.39 volts in microwave cooking condition.

1. Within a 32-seconds base, the thermistor is energized for 2 seconds. At that time, the voltage across the temperature measurement circuit is measured.
2. The oven carries out the procedure above again. If the second voltage is 0.39V higher than first voltage, LSI judges it is a fire in the oven cavity and stop the oven.
3. When LSI judges it is a fire in the oven cavity, LSI will switch off the relays to high voltage transformer and fan motor and LSI stops countering down.



OPEN JUDGE BY THERMISTOR

FUNCTION OF IMPORTANT COMPONENTS

1. If the temperature of the thermistor does not rise to more than 40˚C after 4 minutes and 15 seconds from when the oven is started in convection, grill (top and bottom grills) or dual cooking mode, the oven is turned off.
2. When the thermistor or the wire harness to the thermistor is opened, the oven is turned off after 4 minutes and 15 seconds because this condition is same as above.

DAMPER OPEN-CLOSE MECHANISM

Damper position is set automatically by damper motor, damper switch and motor cam.
These components are operated by a signal that judges if microwave cooking or convection cooking operation is selected by the CPU unit.

Microwave Cooking:
Damper is in the open position, because a portion of cooling air is channelled through the cavity to remove steam and vapours given off from the heating foods.
It is then exhausted at the top of the oven cavity into a condensation compartment.

Convection Cooking:
Damper is in the closed position, so that no hot air will be allowed to leak out the oven cavity.

Damper Operation
1. When power supply cord is plugged in or when the control unit resumes after energy save mode finishes:
1-1. When power supply cord is plugged in, a signal is sensed in the control unit, and operates shut-off relay (RY8).
1-2. Contacts of shut-off relay (RY8) close, the damper motor is energized, opening the damper door.
1-3. When the damper is moved to the open position by the damper cam, damper switch is closed (ON position).
1-4. The signal of damper switch is re-sensed in the control unit and shut-off relay (RY8) is turned off.
1-5. The rated voltage to the damper motor is stopped and the motor turns off.
2. When oven is microwave cooking:
Damper is in the open position
3. When oven is convection cooking:
3-1 Damper motor is energized right after the oven is started.
3-2. When damper is in the closed position (damper switch is OFF), its signal is sensed by the control unit, and shut-off relay (RY8) is de-energized.
3-3. The damper is held in the closed position during the convection cooking operation.
3-4. At the end of the convection cooking, when the fan motor stops, shut-off relay (RY8) is energized, and the damper is returned to the open position.

NOTE: If the damper door is not in the proper position, closed during convection, grill or dual, or open during microwave, the control unit will stop oven operation after 1 minute.

4. Operation of damper is shown below.

Cooking Mode	Operation of Damper
Microwave cooking	Open
Convection cooking	Closed
Grill; during backed up with convection heating element	Closed
Grill; after convection heating element backed up has stopped	Open
Dual (Microwave and Convection)	Closed
Dual (Microwave and Grill)	Open
Fir sensing condition	Closed

TROUBLESHOOTING GUIDE

When troubleshooting the microwave oven, it is helpful to follow the Sequence of Operation in performing the checks. Many of the possible causes of trouble will require that a specific test be performed. These tests are given a procedure letter which will be found in the “Test Procedure” section.

IMPORTANT: If the oven becomes inoperative because of a blown fuse F8A in the monitored latch switch - monitor switch circuit, check the monitored latch switch and monitor switch before replacing the fuse F8A.

TEST PROCEDURE		A	B	C		D	E	E	E	E	F	G	G	G	H	H	H	H	I	J	K	L	L		M	N	O	O	O	O	O	O	O	O	P	Q							
CONDITION	PROBLEM / POSSIBLE CAUSE AND DEFECTIVE PARTS	MAGNETRON	HIGH VOLTAGE TRANSFORMER	H.V. RECTIFIER ASSEMBLY	H.V. HARNESS	HIGH VOLTAGE CAPACITOR	MONITORED LATCH SWITCH SW1	STOP SWITCH	MONITOR SWITCH	DAMPER SWITCH	THERMISTOR	THERMAL CUT-OUT 125ßC	THERMAL CUT-OUT 170ßC (GRILL)	THERMAL CUT-OUT 170ßC (CONV.)	TURNTABLE MOTOR	FAN MOTOR	CONVECTION FAN MOTOR	DAMPER MOTOR	NOISE FILTER	FUSE 20A	FUSE F8A	GRILL HEATING ELEMENT	CONVECTION HEATING ELEMENT	TC TRANSFORMER	TOUCH CONTROL PANEL	KEY UNIT	RELAY RY1	RELAY RY2	RELAY RY3	RELAY RY4	RELAY RY5	RELAY RY6	RELAY RY7	RELAY RY8	FOIL PATTERN ON P.W.B.	AH SENSOR	POWER SUPPLY CORD	OVEN LAMP OR SOCKET	SHORTED WIRE HARNESS	OPENED WIRE HARNESS	BLOCKED VENTILATION OPENINGS	MIS-ADJUSTMENT OF SWITCHES	HOME FUSE OR BREAKER	NO POWER AT WALL OUTLET	BLOCKED CONVECTION FAN	BLOCKED COOLING FAN
OFF CONDITION	Fuse F8A blows when the door is opened.						●														●					●																	
	Home fuse blows when power cord is plugged into wall outlet.																																			●							●		
	Fuse 20A blows when power cord is plugged into wall outlet.																		●	●																			●					
	Nothing appears in display when power cord is plugged into wall outlet and the door is opened and closed.						●					●	●						●	●				●	●						●			●		●			●				●	
	Display does not operate properly when STOP/CLEAR key is touched.							●																	●	●													●					
	Oven lamp does not light when door is opened. (Display operates.)							●																	●		●												●	●	●				
COOKING CONDITION (COMMON MODE)	Oven does not start when the START key is touched. (Display operates.)							●																	●	●													●		●				
	Oven lamp does not light and turntable motor does not operate.													●	●												●												●		●				
	Fan motor does not operate. (Oven lamp lights.)															●																●							●					●
	Convection fan motor does not operate. (Fan motor operates.)																●																●						●				●	
	Turntable motor does not operate. (Oven lamp lights.)						●								●																		●						●		●			
	Oven or any electrical parts (except fan motor) does not stop when cooking time is 0 or STOP/CLEAR key is touched.																								●	●	●	●	●		●	●											
	Oven stops after 4 minutes and 15 seconds since START key is touched. (Except Microwave mode and Dual cook mode)										●														●														●					
	Display operates properly but all electrical parts do not operate.													●													●	●	●	●	●	●							●				
	Oven goes into cook cycle but shuts down before end of cooking cycle.										●	●	●			●		●																								●	●	
	After cooking, the temperature of oven cavity is higher than 120ßC but fan motor does not operate.										●														●																			
	The oven stops 1 minute after starting.									●								●																●					●	●				
MICROWAVE COOKING CONDITION	Oven seems to be operating but little or no heat is produced in oven load. (Microwave power control is set at 100%)	●	●	●	●	●			●												●				●		●										●		●				
	Oven does not seem to be operating properly during variable cooking condition except 100% cooking condition.																								●		●																
	Oven goes into cook cycle but shuts down before end of cooking cycle.										●	●				●		●																●						●	●			●
CONVECTION COOKING CONDITION	Convection cooking mode does not heat.								●		●												●		●					●										●				
	Oven seems to be operating but the temperature in the oven cavity is lower or higher than preset one.										●					●							●		●					●													●	
GRILL COOKING CONDITION	Grill heating element does not operate.								●													●						●										●		●				
DUAL COOKING CONDITION (COMMON MODE)	Oven goes into cook cycle but shuts down before end of cooking cycle.										●	●	●			●		●							●														●	●		●		●
	Oven seems to be operating but little or no heat is produced in oven load. (Microwave power does not seem to be generated properly)	●	●	●	●	●	●		●												●				●		●										●		●				
DUAL COOKING CONDITION (MICRO./CONV.)	Oven seems to be operating but the temperature in the oven cavity is lower or higher than preset one.										●						●						●		●				●													●	
	Convection heating elements do not heat.								●														●							●											●			
DUAL COOKING CONDITION (MICRO./GRILL)	Grill heating element does not heat.								●													●						●										●		●				
SENSOR COOKING CONDITION	Oven is in sensor cooking condition but AH sensor doesnot stop cooking cycle, or oven stop soon and display shows "ERROR".																								●									●	●			●	●				

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

A **MAGNETRON OUTPUT POWER TEST**

The power output of this oven is rated using the method specified by IEC 60705. Full details of how to curry out this procedure can be found in the Sharp Technical Training notes which is available from Sharp Parts Centre (part number SERV-LITMW01).

The IEC60705 procedure must be carried out using laboratory-type procedures and equipment. These requirements make the procedure unsuitable for routine performance checks.

NOTE: The following test method gives an indication of the output power only, it cannot be used to establish the actual/rated output power. If the true output power is required, then the IEC60705 test method must be used.

Alternative simplified method:
1. Place 2 litres of cold water (between 12°C and 20°C) in a suitable container.
2. Stir the water and measure the temperature in °C. Note temperature as T1.
3. Place the container in the microwave and heat the water for 1 minute and 40 seconds on full power.
4. When the 1 min. 40 sec. is completed, remove the container and stir the water. Note the water temperature as T2.
5. Calculate the output power using the following formula:
   R.F. Power Output = (T2 - T1) x 90.

NOTE: The result from this test should be within the allowance of 2000cc alternative method. (±15%).

MICROWAVE LEAKAGE TEST

This oven should be tested for microwave leakage on completion of any repair or adjustment, following the procedure described in the Sharp Technical Training notes (part number SERV-LITMW01). The maximum leakage permitted in BS EN 60335-2-25 is 50mW/cm^2 (equivalent to 5mW/cm^2), however it is not normal to detect any significant leakage, therefore, any leakage which is detected should be investigated.

It is essential that only leakage detectors with current calibration traceable to National Physical Laboratories are used.

Suitable leakage detectors: CELTEC A100
APOLLO X1

B **HIGH VOLTAGE TRANSFORMER TEST**

WARNING:	**High voltage and large currents are present at the secondary winding and filament winding of the high voltage transformer. It is very dangerous to work near this part when the oven is on. NEVER make any voltage measurements of the high-voltage circuits, including the magnetron filament.**

CARRY OUT 3D CHECKS.
Disconnect the leads to the primary winding of the high voltage transformer. Disconnect the filament and secondary winding connections from the rest of the HV circuitry. Using an ohmmeter, set on a low range, it is possible to check the continuity of all three winding. The following readings should be obtained:-

a. Primary winding ..... approximately 2 Ω
b. Secondary winding ..... approximately 127 Ω
c. Filament winding..... less than 1 Ω

If the readings obtained are not stated as above, then the high voltage transformer is probably faulty and should be replaced.
CARRY OUT 4R CHECKS.

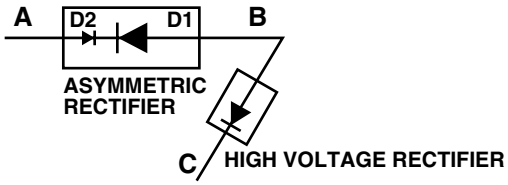
TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

C **HIGH VOLTAGE RECTIFIER TEST**

CARRY OUT 3D CHECKS.
Isolate the high voltage rectifier assembly from the HV circuit. The high voltage rectifier can be tested using an ohmmeter set to its highest range. Connect the ohmmeter across the terminal B+C of the high voltage rectifier and note the reading obtained. Reverse the meter leads and note this second reading. The normal resistance is infinite in one direction and more than 100 kΩ in the other direction.

CARRY OUT 4R CHECKS.



ASYMMETRIC RECTIFIER TEST

CARRY OUT 3D CHECKS.

Isolate the high voltage rectifier assembly from the HV circuit. The asymmetric rectifier can be tested using an ohmmeter set to its highest range across the terminals A+B of the asymmetric rectifier and note the reading obtained. Reverse the meter leads and note this second reading. If an open circuit is indicated in both directions then the asymmetric rectifier is good. If the asymmetric rectifier is shorted in either direction, then the asymmetric rectifier is probably faulty and must be replaced with high voltage rectifier. When the asymmetric rectifier is defective, check whether magnetron, high voltage rectifier, high voltage wire or filament winding of the high voltage transformer is shorted.

CARRY OUT 4R CHECKS.

NOTE: FOR MEASUREMENT OF THE RESISTANCE OF THE RECTIFIER, THE BATTERIES OF THE MEASURING INSTRUMENT MUST HAVE A VOLTAGE AT LEAST 6 VOLTS, BECAUSE OTHERWISE AN INFINITE RESISTANCE MIGHT BE SHOWN IN BOTH DIRECTIONS.

D **HIGH VOLTAGE CAPACITOR TEST**

CARRY OUT 3D CHECKS.

A. Isolate the high voltage capacitor from the circuit.
B. Continuity check must be carried out with measuring instrument which is set to the highest resistance range.
C. A normal capacitor shows continuity for a short time (kick) and then a resistance of about 10MΩ after it has been charged.
D. A short-circuited capacitor shows continuity all the time.
E. An open capacitor constantly shows a resistance about 10 MΩ because of its internal 10MΩ resistance.
F. When the internal wire is opened in the high voltage capacitor shows an infinite resistance.
G. The resistance across all the terminals and the chassis must be infinite when the capacitor is normal.

If incorrect reading are obtained, the high voltage capacitor must be replaced.

CARRY OUT 4R CHECKS.

E **SWITCH TEST**

CARRY OUT 3D CHECKS.
Isolate the switch to be tested and using an ohmmeter check between the terminals as described in the following table.

Table: Terminal Connection of Switch

Plunger Operation	COM to NO	COM to NC
Released	Open circuit	Short circuit
Depressed	Short circuit	Open circuit

COM; Common terminal,
NO; Normally open terminal
NC; Normally close terminal

If incorrect readings are obtained, make the necessary switch adjustment or replace the switch.

CARRY OUT 4R CHECKS.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

F **THERMISTOR TEST**

CARRY OUT 3D CHECKS.

Disconnect the connector B from CPU unit. Measure the resistance of the thermistor with an ohmmeter. Connect the ohmmeter leads to Pin No's C1 and C3 of the thermistor harness.

Room Temperature	Resistance
20˚C - 30˚C	Approximately 359.9 kΩ - 152 kΩ

If the meter does not indiicate above resistance, replace the thermistor.

CARRY OUT 4R CHECKS.

G **THERMAL CUT-OUT TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the terminals of the thermal cut-out. Then using an ohmmeter, make a continuity test across the two terminals as described in the below.

Table: Thermal Cut-out Test

Parts Name	Temperature of "ON" condition (closed circuit).	Temperature of "OFF"condition (open circuit).	Indication of ohmmeter (When room temperature is approx. 20˚C.)
Thermal cut-out 125˚C	This is not resetable	Above 125˚C	Closed circuit
Thermal cut-out 170˚C (GRILL)	Below 155˚C.	Above 170˚C	Closed circuit
Thermal cut-out 170˚C (CONV.)	Below 155˚C.	Above 170˚C	Closed circuit

If incorrect readings are obtained, replace the thermal cut-out.

An open circuit thermal cut-out (MG) indicates that the magnetron has overheated, this may be due to resistricted ventilation, cooling fan failure.

An open circuit thermal cut-out (GRILL) indicates that the oven cavity has overheated, this may be due to no load operation.

An open circuit thermal cut-out (CONV.) indicates that the convection fan motor winding has over heated, this may be due to resisted ventilation or locked cooling fan or locked convection fan motor.

CARRY OUT 4R CHECKS.

H **MOTOR WINDING TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the motor. Using an ohmmeter, check the resistance between the two terminals as described in the table below.

Table: Resistance of Motor

Motors	Resistance
Fan motor	Approximately 293 Ω
Turntable motor	Approximately 15 kΩ
Convection fan motor	Approximately 288 Ω
Damper motor	Approximately 11 kΩ

If incorrect readings are obtained, replace the motor.

CARRY OUT 4R CHECKS.

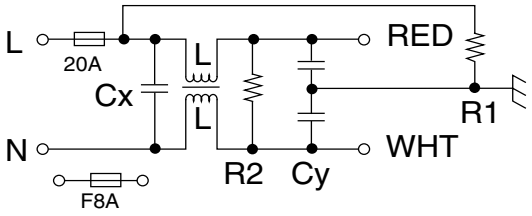
I **NOISE FILTER TEST**

CARRY OUT 3D CHECKS.

Disconnect the leads from the terminals of noise filter.
Using an ohmmeter, check between the terminals as described in the following table.

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST



L (min)	Cx ± 20%	Cy ± 20%
1.0mH	0.22μF	4700pF

MEASURING POINTS	INDICATION OF OHMMETER
Between N and L	Approx. 680 kΩ
Between terminal N and WHITE	Short circuit
Between terminal L and RED	Short circuit

If incorrect readings are absorbed, replace the noise filter unit.

CARRY OUT 4R CHECKS.

J **BLOWN FUSE 20A**

CARRY OUT 3D CHECKS.
If the fuse 20A is blown, there is a shorts or grounds in electrical parts or wire harness. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuse with the correct value replacement.

K **BLOWN FUSE F8A**

CARRY OUT 3D CHECKS.

1. If the fuse F8A is blown when the door is opened, check the monitored latch switch and monitor switch.
2. If the fuse F8A is blown by incorrect door switching replace the defective switch(es) and the fuse F8A.
3. If the fuse F8A is blown, there could be shorts in the asymmetric rectifier or there is a ground in wire harness. A short in the asymmetric rectifier may be occurred due to short or ground in H.V. rectifier, magnetron, high voltage transformer or H.V. wire. Check them and replace the defective parts or repair the wire harness.

CARRY OUT 4R CHECKS.

CAUTION: Only replace fuse F8AH with the correct value replacement.

L **GRILL HEATING ELEMENTS (TOP) AND CONVECTION HEATING ELEMENT TEST**

CARRY OUT 3D CHECKS.

Before carrying out the following tests make sure the heating element is cool completely.

1. Resistance of heating element.
   Disconnect the wire leads to the heating element to be tested. Using ohmmeter with low resistance range. Check the resistance across the terminals of the heating element as described in the following table.

Table: Resistance of heating element

Parts name	Resistance
Grill heating elements (top)	Approximately 44.4 Ω (22.2 Ω x 2)
Convection heating element	Approximately 42.5 Ω

2. Insulation resistance.
   Disconnect the wire leads to the heating element to be tested. Check the insulation resistance between the element terminal and cavity using a 500V - 100MΩ insulation tester. The insulation resistance should be more than 10 MΩ in the cold start.

If the results of above test 1 and/or 2 are out of above specifications, the heating element is probably faulty and should be replaced.

CARRY OUT 4R CHECKS.

PROCEDURE LETTER	COMPONENT TEST

M **TOUCH CONTROL PANEL ASSEMBLY TEST**

The touch control panel consists of circuits including semiconductors such as LSI, ICs, etc. Therefore, unlike conventional microwave ovens, proper maintenance can not be performed with only a voltmeter and ohmmeter.
In this service manual, the touch control panel assembly is divided into two units, Control Unit and Key Unit, and also the Control unit is divided into two units, CPU unit and Power unit, and troubleshooting by replacement is described according to the symptoms indicated.

1. Key Unit Note : Check key unit ribbon connection before replacement.
   The following symptoms indicate a defective key unit. Replace the key unit.
   a) When touching the pads, a certain pad produces no signal at all.
   b) When touching a number pad, two figures or more are displayed.
   c) When touching the pads, sometimes a pad produces no signal.
2. Control Panel
   The following symptoms indicate a defective control unit. Before replacing the control unit perform the key unit test (Procedure N) to determine if control unit is faulty.

2-1 In connection with pads
   a) When touching the pads, a certain group of pads do not produce a signal.
   b) When touching the pads, no pads produce a signal.

2-2 In connection with indicators
   a) At a certain digit, all or some segments do not light up.
   b) At a certain digit, brightness is low.
   c) Only one indicator does not light up.
   d) The corresponding segments of all digits do not light up; or they continue to light up.
   e) Wrong figure appears.
   f) A certain group of indicators do not light up.
   g) The figure of all digits flicker.

2-3 Other possible troubles caused by defective control unit.
   a) Buzzer does not sound or continues to sound.
   b) Clock does not operate properly.
   c) Cooking is not possible.
   d) Proper temperature measurement is not obtained.

N **KEY UNIT TEST**

If the display fails to clear when the STOP/CLEAR pad is depressed, first verify the flat ribbon cable is marking good contact, verify that the door sensing switch (stop switch) operates properly; that is the contacts are closed when the door is closed and open when the door is open. If the door sensing switch (stop switch) is good, disconnect the flat ribbon cable that connects the key unit to the control unit and make sure the door sensing switch is closed (either close the door or short the door sensing switch connecter). Use the Key unit matrix indicated on the control panel schematic and place a jumper wire between the pins that correspond to the STOP/CLEAR pad marking momentary contact. If the control unit responds by clearing with a beep the key unit is faulty and must be replaced. If the control unit does not respond, it is faulty and must be replaced. If a specific pad does not respond, the above method may be used (after clearing the control unit) to determine if the control unit or key pad is at fault.

CARRY OUT 4R CHECKS.

	G8	G7	G6	G5	G4	G3	G2	G1
G9	ROAST POULTRY	ROAST PORK	STEAK/ CHOPS	CHICKEN PORTIONS	ROAST BEEF/ LAMB	10 sec.	1 min.	10 min.
G10	MINCED MEAT		AUTO COOK				GRILL	
G11		△ MORE	▽ LESS	AUTO START / CLOCK	START / AUTO MINUTE	△ UP	MICRO. POWER	▽ DOWN
G12		DUAL CONV./ GRILL			Kg / Lb	KITCHEN TIMER	CONV. (˚C)	STOP / CLEAR

R-953(SL)M/(W)M

	G8	G7	G6	G5	G4	G3	G2	G1
G9	ROAST POULTRY	ROAST PORK	STEAK/ CHOPS	CHICKEN PORTIONS	ROAST BEEF/ LAMB	10 sec.	1 min.	10 min.
G10	MINCED MEAT	CANNED FOOD	FRESH VEG.	FROZEN READY MEALS	CHILLED READY MEALS	FRESH FISH	GRILL	AUTO COOK
G11		△ MORE	▽ LESS	AUTO START / CLOCK	START / AUTO MINUTE	△ UP	MICRO. POWER	▽ DOWN
G12		DUAL CONV./ GRILL	RICE/ PASTA	STOP / CLEAR	Kg / Lb	KITCHEN TIMER	CONV. (˚C)	info

R-963(SL)M/(W)M

TEST PROCEDURES

PROCEDURE LETTER	COMPONENT TEST

O **RELAY TEST**

CARRY OUT 3D CHECKS.

Remove the outer case and check voltage between Pin Nos. 1 and 3 of the 4 pin connector (E) on the control unit with an A.C. voltmeter.
The meter should indicate 230-240 volts, if not check oven circuit.

Relay Test
Check voltage at the relay coil with a D.C. voltmeter during the microwave cooking operation, grill operation, convection operation or dual operation.

DC. voltage indicated ..... Defective relay.
DC. voltage not indicated .... Check diode which is connected to the relay coil. If diode is good, control unit is defective.

RELAY SYMBOL	OPERATIONAL VOLTAGE	CONNECTED COMPONENTS
RY1	Approx. 18.0V D.C.	Oven lamp / Turntable motor
RY2	Approx. 18.0V D.C.	High voltage transformer
RY3	Approx. 24.0V D.C.	Grill (Top) heating element
RY4	Approx. 24.0V D.C.	Convection heating element
RY5	Approx. 24.0V D.C.	Touch control transformer
RY6	Approx. 24.0V D.C.	Fan motor
RY7	Approx. 24.0V D.C.	Convection motor
RY8	Approx. 24.0V D.C.	Damper motor

CARRY OUT 4R CHECKS.

P **PROCEDURES TO BE TAKEN WHEN THE FOIL PATTERN ON THE PRINTED WIRING BOARD (PWB) IS OPEN**

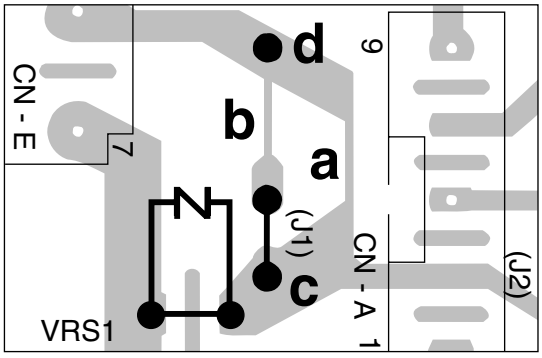
To protect the electronic circuits, this model is provided with a fine foil pattern added to the input circuit on the PWB, this foil pattern acts as a fuse. If the foil pattern is open, follow the troubleshooting guide given below for repair.
Problem: POWER ON, indicator does not light up.

CARRY OUT 3D CHECKS.

STEPS	OCCURRENCE	CAUSE OR CORRECTION
1	The rated AC voltage is not present between Pin Nos. 1 and 3 of the 4-pin connector (E).	Check supply voltage and oven power cord.
2	The rated AC voltage is present at primary side of low voltage transformer.	Low voltage transformer or secondary circuit defective. Check and repair.
3	Only pattern at "a" is broken.	*Insert jumper wire J1 and solder. (CARRY OUT 3D CHECKS BEFORE REPAIR.)
4	Pattern at "a" and "b" are broken.	*Insert the coil RCILF2003YAZZ between "c" and "d". (CARRY OUT 3D CHECKS BEFORE REPAIR.)

NOTE: *At the time of these repairs, make a visual inspection of the varistor for burning damage and examine the transformer with tester for the presence of layer short circuit (check primary coil resistance). If any abnormal condition is detected, replace the defective parts.

CARRY OUT 4R CHECKS.



PROCEDURE LETTER	COMPONENT TEST

Q **AH SENSOR TEST FOR R- 963(SL)M/(W)M**

Checking the initial sensor cooking condition

(1) The oven should be plugged in at least two minutes before sensor cooking.
(2) Room temperature should not exceed 35˚C.
(3) The unit should not be installed in any area where heat and steam are generated. The unit should not be installed, for example, next to a conventional surface unit. Refer to the "INSTALLATION Instructions" .
(4) Exhaust vents are provided on the back of the unit for proper cooling and air flow in the cavity. To permit adequate ventilation, be sure to install so as not to block these vents. There should be some space for air circulation.
(5) Be sure the exterior of the cooking container and the interior of the oven are dry. Wipe off any moisture with a dry cloth or paper towel.
(6) The Sensor works with food at normal storage temperature. For example, chicken pieces would be at refrigerator temperature and canned soup at room temperature.
(7) Avoid using aerosol sprays or cleaning solvents near the oven while using Sensor settings. The sensor will detect the vapour given of by the spray and turn off before food is properly cooked.
(8) If the sensor has not detected the vapour of the food, ERROR will appear and the oven will shut off.

Water load cooking test

Make sure the oven has been plugged in at least five minutes before checking sensor cook operation. The cabinet should be installed and screws tightened.
(1) Fill approximately 200 milliliters (7.2 oz) of tap water in a 1000 milliliter measuring cup.
(2) Place the container on the center of tray in the oven cavity.
(3) Close the door.
(4) Touch FRESH FISH pad. Now, the oven is in the sensor cooking condition and "FRESH FISH" will appear in the display.
(5) The oven will operate for the first 16 seconds, without generating microwave energy.
NOTE: ERROR will appear if the door is opened or STOP/CLEAR pad is touched during first stage of sensor cooking.
(6) After approximately 16 seconds, microwave energy is produced, and the display should start to count down the remaining cooking time, and oven should turn off after water is boiling (bubbling).
If the oven does not turn off, replace the AH sensor or check the control unit, refer to explanation below.

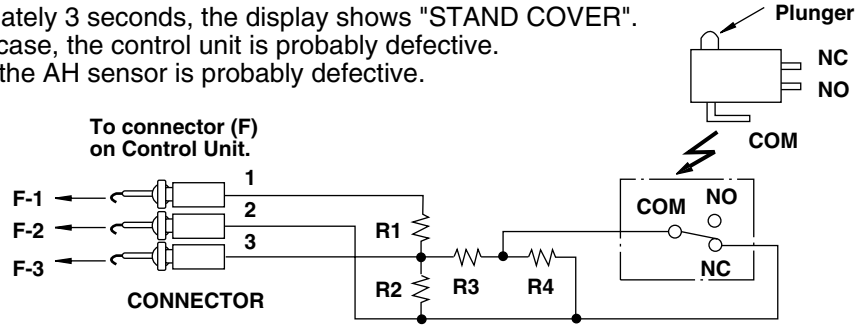
TESTING METHOD FOR AH SENSOR AND/OR CONTROL UNIT

To determine if the sensor is defective, the simplest method is to replace it with a new replacement sensor.
(1) Disconnect oven from power supply and remove outer case.
(2) Discharge the high voltage capacitor.
(3) Remove the AH sensor.
(4) Install the new AH sensor.
(5) Re-install the outer case.
(6) Reconnect the oven to the power supply and check the sensor cook operation proceed as follows:
6-1. Fill approximately 200 milliliters (7.2 oz) of tap water in a 1000 milliliter measuring cup.
6-2. Place the container on the center of tray in the oven cavity.
6-3. Close the door.
6-4. Touch FRESH FISH pad.
6-5. The control panel is in automatic sensor operation.
6-6. The display will start to count down the remaining cooking time, and the oven will turn off automatically after the water is boiling (babbling).
If new sensor dose not operate properly, the problem is with the control unit.

CHECKING CONTROL UNIT

(1) Disconnect oven from power supply and remove outer case.
(2) Discharge the high voltage capacitor.
(3) Disconnect the wire leads from the cook relay.
(4) Disconnect the sensor connector that is mounted to lower portion of control panel.
(5) Then connect the dummy resistor circuit (see fig.) to the sensor connector of control panel.
(6) Reconnect the oven to the power supply and check the sensor cook operation, proceed as follows:
6-1. Touch FRESH FISH pad.
6-2. The control panel is in the sensor cooking operation.
6-3. After approximately 30 seconds, push plunger of select switch. This condition is same as judgement by AH sensor.

6-4. After approximately 3 seconds, the display shows "STAND COVER".
If the above is not the case, the control unit is probably defective.
If the above is proper, the AH sensor is probably defective.



R1,R2 : 22Ω ± 1% 1/2W
R3 : 4.3kΩ ± 5% 1/4W
R4 : 1MΩ ± 5% 1/4W

Sensor Dummy Resistor Circuit

TOUCH CONTROL PANEL ASSEMBLY

OUTLINE OF TOUCH CONTROL PANEL

The touch control section consists of the following units as shown in the touch control panel circuit.

(1) Key Unit
(2) Control Unit (The Control unit consists of Power unit and CPU unit.)

The principal functions of these units and signals communicated among them are explained below.

Key Unit
The key unit is composed of a matrix, signals generated in the LSI are sent to the key unit from P10, P11, P12, P13, P14, P15, P16 and P17.
When a key pad is touched, a signal is completed through the key unit and passed back to the LSI through P70, P71, P72 and P73 to perform the function that was requested.

Control Unit
Control unit consists of LSI, power source circuit, synchronizing signal circuit, ACL circuit, buzzer circuit, relay circuit, temperature measurement circuit, indicator circuit, absolute humidity sensor circuit and back light circuit.

1) LSI
This LSI controls the temperature measurement signal, absolute humidity sensor signal, key strobe signal, relay driving signal for oven function and indicator signal.

2) Power Source Circuit
This circuit generates voltage necessary in the control unit.

Symbol	Voltage	Application
VC	-5.2V	LSI(IC1)

3) Synchronizing Signal Circuit
The power source synchronizing signal is available in order to compose a basic standard time in the clock circuit. It accompanies a very small error because it works on commercial frequency.

4) ACL
A circuit to generate a signal which resets the LSI to the initial state when power is supplied.

5) Buzzer Circuit
The buzzer is responsive to signals from the LSI to emit audible sounds (key touch sound and completion sound).

6) Door Sensing Switch (Stop Switch)
A switch to "tell" the LSI if the door is open or closed.

7) Relay Circuit
To drive the magnetron, grill heating element, convection heating element, convection motor, fan motor, turntable motor, damper motor, touch control transformer and light the oven lamp.

8) Back Light Circuit
A circuit to drive the back light (Light emitting diodes LD10 - LD19).

9) Indicator Circuit
This circuit consists 40-segments and 16-common electrodes using a Liquid Crystal Display.
The Liquit Crystal Display (LCD) is drived by LCD driver IC3.

10) Temperature Measurement Circuit : (OVEN THERMISTOR)
The temperature in the oven cavity is sensed by the thermistor. The variation of resistance according to sensed temperature is detected by the temperature measurement circuit and the result applied to LSI. The LSI uses this information to control the relay and display units.

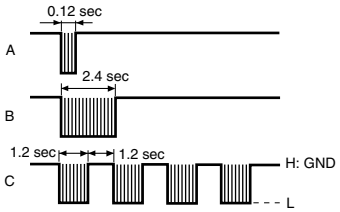
11) Damper Switch
A switch to tell the LSI if the damper is open or close.

12) Absolute Humidity Sensor Circuit (For only R-963(SL)M/(W)M)
This circuit detects the humidity of the food which is being cooked, to control its automatic cooking.

DESCRIPTION OF LSI

LSI(IXA034DR)

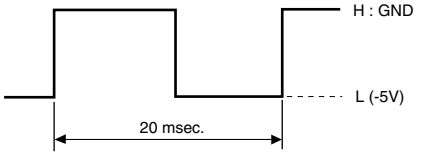
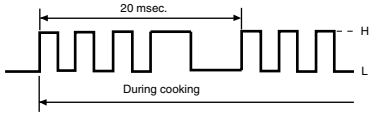
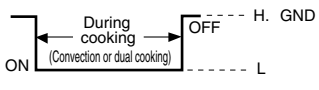
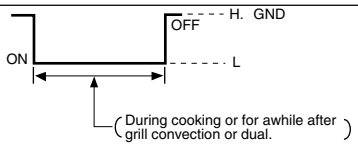
The I/O signal of the LSI(IXA034DR) are detailed in the following table.

<table>
<tr><th>Pin No.</th><th>Signal</th><th>I/O</th><th>Description</th></tr>
<tr><td>1</td><td>AN0</td><td>IN</td><td>Terminal not used. (For only R-953(SL)M/(W)M)</td></tr>
<tr><td>1</td><td>AN0</td><td>IN</td><td>Used for initial balancing of the bridge circuit (absolute humidity sensor). This input is an analog input terminal from the AH sensor circuit, and connected to the A/D converter built into the LSI. (For only R-963(SL)M/(W)M)</td></tr>
<tr><td>2</td><td>P77</td><td>OUT</td><td><u>Timing signal output terminal for temperature measurement(OVEN THERMISTOR).</u>
"H" level (GND) : Thermistor OPEN timing.
"L" level (-5V) : Temperature measuring timing. (Convection cooking)</td></tr>
<tr><td>3</td><td>P76</td><td>OUT</td><td><u>Timing signal output terminal for temperature measurement(OVEN THERMISTOR).</u>
"H" level (GND) : Thermistor OPEN timing.
"L" level (-5V) : Temperature measuring timing. (Convection cooking)</td></tr>
<tr><td>4-5</td><td>P75-P74</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>6</td><td>P73</td><td>IN</td><td><u>Signal coming from touch key.</u>
When any one of G9 line keys on key matrix is touched, a corresponding signal from P10, P11, P12, P13, P14, P15, P16 and P17 will be input into P73. When no key is touched, the signal is held at "L" level.</td></tr>
<tr><td>7</td><td>P72</td><td>IN</td><td><u>Signal similar to P73.</u>
When any one of G10 line keys on key matrix is touched, a corresponding signal will be input into P72.</td></tr>
<tr><td>8</td><td>P71</td><td>IN</td><td><u>Signal similar to P73.</u>
When any one of G11 line keys on key matrix is touched, a corresponding signal will be input into P71.</td></tr>
<tr><td>9</td><td>P70</td><td>IN</td><td><u>Signal similar to P73.</u>
When any one of G12 line keys on key matrix is touched, a corresponding signal will be input into P70.</td></tr>
<tr><td>10-11</td><td>P57-P56</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>12</td><td>P55</td><td>OUT</td><td><u>Signal to sound buzzer.</u>
A: key touch sound.
B: Completion sound.
C: When the temperature of the oven cavity reaches the preset temperature in the preheating mode, or when the preheating hold time (30 minutes) is elapsed.
 
</td></tr>
<tr><td>13-17</td><td>P54-P50</td><td>OUT</td><td>Terminal not used. (For only R-953(SL)M/(W)M)</td></tr>
<tr><td>13-17</td><td>P54-P50</td><td>OUT</td><td>Used for initial balancing of the bridge circuit (absolute humidity sensor). (For only R-963(SL)M/(W)M)</td></tr>
<tr><td>18</td><td>P47</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>19</td><td>P46</td><td>IN</td><td><u>Input signal which communicates the damper open/close information to LSI.</u>
Damper opened; "H" level signal (0V:GND).
Damper closed; "L" level signal (-5V:VC).</td></tr>
<tr><td>20</td><td>P45</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>21</td><td>P44</td><td>OUT</td><td><u>Magnetron high-voltage circuit driving signal.</u>
To turn on and off the cook relay (RY2). In 100% operation, the signals hold "L" level during microwave cooking and "H" level while not cooking. In other cooking modes (70%, 50%, 30%, 10%) the signal turns to "H" level and "L" level in repetition according to the power level.
ON/OFF time ratio in Micro cooking (a. 32second time base)
<table><tr><th>MICRO COOK</th><th>ON</th><th>OFF</th></tr><tr><td>100%</td><td>32 sec.</td><td>0 sec.</td></tr><tr><td>70%</td><td>24 sec.</td><td>8 sec.</td></tr><tr><td>50%</td><td>18 sec.</td><td>14 sec.</td></tr><tr><td>30%</td><td>12 sec.</td><td>20 sec.</td></tr><tr><td>10%</td><td>6 sec.</td><td>26 sec.</td></tr></table>ON/OFF time ratio in Micro cooking (a. 48second time base)
<table><tr><th>MICRO COOK</th><th>ON</th><th>OFF</th></tr><tr><td>100%</td><td>48 sec.</td><td>0 sec.</td></tr><tr><td>70%</td><td>36 sec.</td><td>12 sec.</td></tr><tr><td>50%</td><td>26 sec.</td><td>22 sec.</td></tr><tr><td>30%</td><td>16 sec.</td><td>32 sec.</td></tr><tr><td>10%</td><td>8 sec.</td><td>40 sec.</td></tr></table></td></tr>
</table>

DESCRIPTION OF LSI

LSI(IXA034DR)

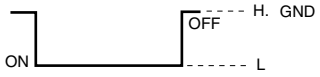
The I/O signal of the LSI(IXA034DR) are detailed in the following table.

<table>
<tr><th>Pin No.</th><th>Signal</th><th>I/O</th><th>Description</th></tr>
<tr><td>22</td><td>INT1</td><td>OUT</td><td>Terminal not used.</td></tr>
<tr><td>23</td><td>INT0</td><td>IN</td><td><u>Signal to synchronized LSI with commercial power source frequency(50Hz).</u>
This is basic timing for time processing of LSI.
 
</td></tr>
<tr><td>24</td><td>CNVSS</td><td>IN</td><td>Connected to VC.</td></tr>
<tr><td>25</td><td>RESET</td><td>IN</td><td><u>Auto clear terminal.</u>
Signal is input to reset the LSI to the initial state when power is applied. Temporarily set to "L" level the moment power is applied, at this time the LSI is reset. Thereafter set at "H" level.</td></tr>
<tr><td>26</td><td>P41</td><td>IN/OUT</td><td>Memory (EEPROM) data input/output.</td></tr>
<tr><td>27</td><td>P40</td><td>OUT</td><td>Memory (EEPROM) clock out.</td></tr>
<tr><td>28</td><td>XIN</td><td>IN</td><td><u>Internal clock oscillation frequency input setting.</u>
The internal clock frequency is set by inserting the ceramic filter oscillation circuit with respect to XIN terminal.</td></tr>
<tr><td>29</td><td>XOUT</td><td>OUT</td><td><u>Internal clock oscillation frequency control output.</u>
Output to control oscillation input of XOUT.</td></tr>
<tr><td>30</td><td>VSS</td><td>IN</td><td><u>Power source voltage: -5V.</u>
VC voltage of power source circuit input.</td></tr>
<tr><td>31</td><td>P27</td><td>OUT</td><td><u>Grill (TOP) heating element driving signal.</u>
To turn on and off the grill heating element relay (RY3). "L" level during grill cooking, convection cooking or dual cooking, "H" level otherwise. The heater relay turns on and off within a 48 second time base in accordance with the special program in LSI.
<table>
<tr><th>Power output</th><th>ON time</th><th>OFF time</th></tr>
<tr><td>100 %</td><td>48 sec.</td><td>0 sec.</td></tr>
<tr><td>90 %</td><td>44 sec.</td><td>4 sec.</td></tr>
<tr><td>80 %</td><td>40 sec.</td><td>8 sec.</td></tr>
<tr><td>70 %</td><td>36 sec.</td><td>12 sec.</td></tr>
<tr><td>60 %</td><td>32 sec.</td><td>16 sec.</td></tr>
<tr><td>50 %</td><td>26 sec.</td><td>22 sec.</td></tr>
<tr><td>40 %</td><td>22 sec.</td><td>26 sec.</td></tr>
<tr><td>30 %</td><td>16 sec.</td><td>32 sec.</td></tr>
<tr><td>20 %</td><td>12 sec.</td><td>36 sec.</td></tr>
<tr><td>10 %</td><td>8 sec.</td><td>40 sec.</td></tr>
</table></td></tr>
<tr><td>32</td><td>P26</td><td>OUT</td><td><u>Convection heating element driving signal.</u>
To turn on and off the relay (RY4). "L" level during grill cooking, convection cooking or dual cooking, "H" level otherwise.
The heater relay turns on and off within a 48 second time base in accordance with the special program in LSI.
<table>
<tr><th>Power output</th><th>ON time</th><th>OFF time</th></tr>
<tr><td>100 %</td><td>48 sec.</td><td>0 sec.</td></tr>
<tr><td>90 %</td><td>44 sec.</td><td>4 sec.</td></tr>
<tr><td>80 %</td><td>40 sec.</td><td>8 sec.</td></tr>
<tr><td>70 %</td><td>36 sec.</td><td>12 sec.</td></tr>
<tr><td>60 %</td><td>32 sec.</td><td>16 sec.</td></tr>
<tr><td>50 %</td><td>26 sec.</td><td>22 sec.</td></tr>
<tr><td>40 %</td><td>22 sec.</td><td>26 sec.</td></tr>
<tr><td>30 %</td><td>16 sec.</td><td>32 sec.</td></tr>
<tr><td>20 %</td><td>12 sec.</td><td>36 sec.</td></tr>
<tr><td>10 %</td><td>8 sec.</td><td>40 sec.</td></tr>
</table></td></tr>
<tr><td>33</td><td>P25</td><td>OUT</td><td><u>Oven lamp and turntable motor driving signal(Square Waveform : 50Hz).</u>
To turn on and off shut-off relay (RY1). The square waveform voltage is delivered to the relay (RY1) driving circuit.
 
</td></tr>
<tr><td>34</td><td>P24</td><td>OUT</td><td><u>Convection motor driving signal.</u>
To turn on and off shut-off relay(RY7). "L" level during convection or dual cooking "H" level otherwise. (Relay RY7 does not turn on at preheating mode.)
 
</td></tr>
<tr><td>35</td><td>P23</td><td>OUT</td><td><u>Fan motor driving signal.</u>
To turn on and off the fan motor relay RY6. "L" level during cooking, or for 5 minutes after grill cooking or for a while after convection or dual cooking. "H" level otherwise.
 
</td></tr>
</table>

DESCRIPTION OF LSI

LSI(IXA034DR)

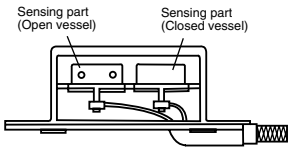
The I/O signal of the LSI(IXA034DR) are detailed in the following table.

Pin No.	Signal	I/O	Description
36	P22	OUT	Terminal not used.
37	P21	OUT	**Damper motor relay driving signal.** To turn on and off shut-off relay (RY8). 
38	P20	OUT	**Touch control transformer driving signal.** To turn on and off the shut off relay (RY5). If the oven has not been used for more than 2 minutes, the relay RY5 will be turned off. The relay RY5 will be turned on when the oven door is opened and closed.
39	P17	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P70 - P73 terminal while one of G8 line key on matrix is touched.
40	P16	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P70 - P73 terminal while one of G7 line key on matrix is touched.
41	P15	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P70 - P73 terminal while one of G6 line key on matrix is touched.
42	P14	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P70 - P73 terminal while one of G5 line key on matrix is touched.
43	P13	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P70 - P73 terminal while one of G4 line key on matrix is touched.
44	P12	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P70 - P73 terminal while one of G3 line key on matrix is touched.
45	P11	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P70 - P73 terminal while one of G2 line key on matrix is touched.
46	P10	OUT	**Key strobe signal.** Signal applied to touch-key section. A pulse signal is input to P70 - P73 terminal while one of G1 line key on matrix is touched.
47-52	P07-P02	OUT	Terminal not used.
53-54	P01-P00	OUT	Data output terminal to LCD driver IC3.
55-62	P37-P30	OUT	Data output terminal to LCD driver IC3.
63-66	P87-P84	OUT	Data output terminal to LCD driver IC3.
67-70	P83-P80	IN	Input terminal to change the specification of model.
71	VCC	IN	Connected to GND.
72	VREF	IN	Connected to GND.
73	AVSS	IN	Connected to VC.
74-76	AN7-AN5	IN	Heating constant compensation terminal.
77	AN4	OUT	Terminal not used.
78	AN3	IN	**Temperature measurement input: OVEN THERMISTOR.** By inputting DC voltage corresponding to the temperature detected by the thermistor, this input is converted into temperature by the A/D converter built into the LSI.
79	AN2	IN	**Input signal which communicates the door open/close information to LSI.** Door closed; "H" level signal. Door opened; "L" level signal.
80	AN1	IN	Terminal not used. **(For only R-953(SL)M/(W)M)**
80	AN1	IN	**AH sensor input.** This input is an analog input terminal from the AH sensor circuit, and connected to the A/D converter built into the LSI. **(For only R-963(SL)M/(W)M)**

ABSOLUTE HUMIDITY SENSOR CIRCUIT

(1) Structure of Absolute Humidity Sensor

The absolute humidity sensor includes two thermistors as shown in the illustration. One thermistor is housed in the closed vessel filled with dry air while another in the open vessel. Each sensor is provided with the protective cover made of metal mesh to be protected from the external airflow.

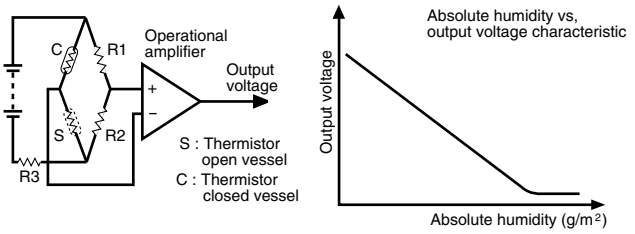


(2) Operational Principle of Absolute Humidity Sensor

The figure below shows the basic structure of an absolute humidity sensor. A bridge circuit is formed by two thermistors and two resistors (R1 and R2).

The output of the bridge circuit is to be amplified by the operational amplifier.

Each thermistor is supplied with a current to keep it heated at about 150˚C, the resultant heat is dissipated in the air and if the two thermistors are placed in different humidity conditions they show different degrees of heat conductivity leading to a potential difference between them causing an output voltage from the bridge circuit, the intensity of which is increased as the absolute humidity of the air increases. Since the output is very minute, it is amplified by the operational amplifier.



(3) Detector Circuit of Absolute Humidity Sensor Circuit

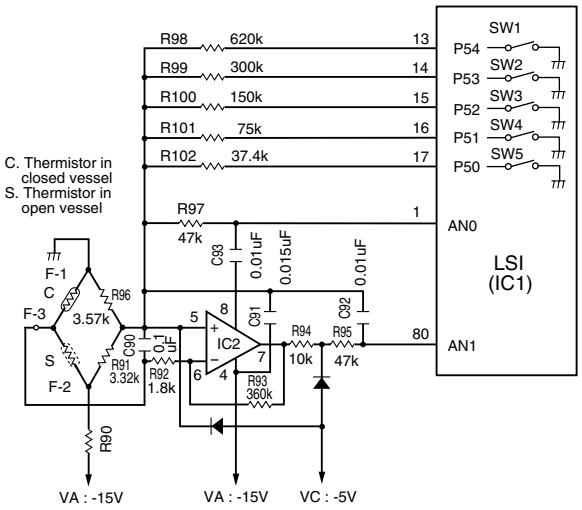
This detector circuit is used to detect the output voltage of the absolute humidity circuit to allow the LSI to control sensor cooking of the unit. When the unit is set in the sensor cooking mode, 16 seconds clearing cycle occurs than the detector circuit starts to function and the LSI observes the initial voltage available at its AN1 terminal.

With this voltage given, the switches SW1 to SW5 in the LSI are turned on in such a way as to change the resistance values in parallel with R97 ~ R102. Changing the resistance values results in that there is the same potential at both F-3 terminal of the absolute humidity sensor and AN0 terminal of the LSI. The voltage of AN1 terminal will indicate about -2.5V. This initial balancing is set up about 16 seconds after the unit is put in the Sensor Cooking mode. As the sensor cooking proceeds, the food is heated to generate moisture by which the resistance balance of the bridge circuit is deviated to increase the voltage available at AN1 terminal of the LSI.

Then the LSI observes that voltage at AN1 terminal and compares it with its initial value, and when the comparison rate reaches the preset value (fixed for each menu to be cooked), the LSI causes the unit to stop sensor cooking; thereafter, the unit goes in the next operation automatically.

When the LSI starts to detect the initial voltage at AN1 terminal 16 seconds after the unit has been put in the Sensor Cooking mode, if it is not possible to balance the bridge circuit to disconnection of the absolute humidity sensor, ERROR will appear on the display and the cooking is stopped.

1) Absolute humidity sensor circuit



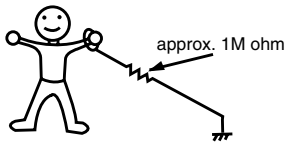
SERVICING

1. Precautions for Handling Electronic Components

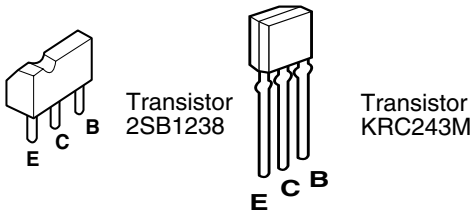
This unit uses CMOS LSI in the integral part of the circuits. When handling these parts, the following precautions should be strictly followed. CMOS LSI have extremely high impedance at its input and output terminals. For this reason, it is easily influenced by the surrounding high voltage power source, static electricity charge in clothes, etc., and sometimes it is not fully protected by the built-in protection circuit.

In order to protect CMOS LSI.

1) When storing and transporting, thoroughly wrap them in aluminium foil. Also wrap PW boards containing them in aluminium foil.
2) When soldering, ground the technician as shown in the figure and use grounded soldering iron and work table.



2. Shapes of Electronic Components



3. Servicing of Touch Control Panel

We describe the procedures to permit servicing of the touch control panel of the microwave oven and the precautions you must take when doing so.

To perform the servicing, power to the touch control panel is available either from the power line of the oven itself or from an external power source.

(1) Servicing the touch control panel with power supply of the oven :

CAUTION:
THE HIGH VOLTAGE TRANSFORMER OF THE MICROWAVE OVEN IS STILL LIVE DURING SERVICING AND PRESENTS A HAZARD .

Therefore, before checking the performance of the touch control panel,

1) Disconnect the power supply cord, and then remove outer case.
2) Open the door and block it open.
3) Discharge high voltage capacitor.
4) Disconnect the leads to the primary of the power transformer.
5) Ensure that these leads remain isolated from other components and oven chassis by using insulation tape.
6) After that procedure, re-connect the power supply cord.

After checking the performance of the touch control panel,

1) Disconnect the power supply cord.
2) Open the door and block it open.
3) Re-connect the leads to the primary of the power transformer.
4) Re-install the outer case (cabinet).
5) Re-connect the power supply cord after the outer case is installed.
6) Run the oven and check all functions.

A. On some models, the power supply cord between the touch control panel and the oven itself is so short that the two can't be separated.

For those models, check and repair all the controls (sensor-related ones included) of the touch control panel while keeping it connected to the oven.

B. On some models, the power supply cord between the touch control panel and the oven proper is long enough that they may be separated from each other. For those models, therefore, it is possible to check and repair the controls of the touch control panel while keeping it apart from the oven proper; in this case you must short both ends of the door sensing switch (on PWB) of the touch control panel with a jumper, which brings about an operational state that is equivalent to the oven door being closed. As for the sensor-related controls of the touch control panel, checking them is possible if the dummy resistor(s) with resistance equal to that of the controls are used.

(2) Servicing the touch control panel with power supply from an external power source:

Disconnect the touch control panel completely from the oven proper, and short both ends of the door sensing switch (on PWB) of the touch control panel, which brings about an operational state that is equivalent to the oven door being closed. Connect an external power source to the power input terminal of the touch control panel, then it is possible to check and repair the controls of the touch control panel; it is also possible to check the sensor-related controls of the touch control panel by using the dummy resistor(s).

4. Servicing Tools

Tools required to service the touch control panel assembly.

1) Soldering iron: 30W
(It is recommended to use a soldering iron with a grounding terminal.)
2) Oscilloscope: Single beam, frequency range: DC - 10MHz type or more advanced model.
3) Others: Hand tools

5. Other Precautions

1) Before turning on the power source of the control unit, remove the aluminium foil applied for preventing static electricity.
2) Connect the connector of the key unit to the control unit being sure that the lead wires are not twisted.
3) After aluminium foil is removed, be careful that abnormal voltage due to static electricity etc. is not applied to the input or output terminals.
4) Attach connectors, electrolytic capacitors, etc. to PWB, making sure that all connections are tight.
5) Be sure to use specified components where high precision is required.

COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

WARNING: Avoid possible exposure to microwave energy. Please follow the instructions below before operating the oven.

1. Disconnect oven from power supply.
2. Visually check the door and cavity face plate for damage (dents, cracks, signs of arcing etc.).

Carry out any remedial work that is necessary before operating the oven.
Do not operate the oven if any of the following conditions exist;
1. Door does not close firmly.
2. Door hinge, support or latch hook is damaged.
3. The door gasket or seal or damaged.
4. The door is bent or warped.
5. There are defective parts in the door interlock system.
6. There are defective parts in the microwave generating and transmission assembly.
7. There is visible damage to the oven.

Do not operate the oven:
1. Without the RF gasket (Magnetron).
2. If the wave guide or oven cavity are not intact.
3. If the door is not closed.
4. If the outer case (cabinet) is not fitted.

Please refer to 'OVEN PARTS, CABINET PARTS, CONTROL PANEL PARTS, DOOR PARTS', when carrying out any of the following removal procedures:

WARNING FOR WIRING

To prevent an electric shock, take the following manners.
1. Before wiring,
   1) Disconnect the power supply.
   2) Open the door and wedge the door open.
   3) Discharge the high voltage capacitor and wait for 60 seconds.
2. Don't let the wire leads touch to the following parts;
   1) High voltage parts:
      Magnetron, High voltage transformer, High voltage capacitor and High voltage rectifier assembly.
   2) Hot parts:
      Grill heating element, Convection heating element, Oven lamp, Magnetron, High voltage transformer and Oven cavity.
   3) Sharp edge:
      Bottom plate, Oven cavity, Weveguide flange, Chassis support and other metallic plate.
   4) Movable parts (to prevent a fault)
      Fan blade, Fan motor, Switch, Turntable motor, Convection motor, Convection fan, Cooling fan.
3. Do not catch the wire leads in the outer case cabinet.
4. Insert the positive lock connector certainly until its pin is locked. And make sure that the wire leads should not come off even if the wire leads is pulled.
5. To prevent an error function, connect the wire leads correctly, referring to the Pictorial Diagram.

OUTER CASE REMOVAL

To remove the outer case proceed as follows.
1. Disconnect oven from power supply.
2. Open the oven door and wedge it open.
3. Remove the one (1) screw holding the air to the oven cavity rear plate.
4. Remove the air duct.
5. Remove the nine (9) screws from rear and along the side edge of case.
6. Slide the entire case back about 3 cm to free it from retaining clips on the cavity face plate.
7. Lift the entire case from the oven.
8. Discharge the H.V. capacitor before carrying out any further work.
10. Do not operate the oven with the outer case removed.

N.B.; Step 1, 2 and 8 form the basis of the 3D checks.

CAUTION: DISCHARGE HIGH VOLTAGE CAPACITOR BEFORE TOUCHING ANY OVEN COMPONENT OR WIRING.

HIGH VOLTAGE COMPONENTS REMOVAL (HIGH VOLTAGE CAPACITOR AND HIGH VOLTAGE RECTIFIER ASSEMBLY)

To remove the components, proceed as follows.
1. CARRY OUT 3D CHECKS.
2. Disconnect the filament lead of the high voltage transformer and the high voltage wire of the high voltage transformer from the high voltage capacitor.
3. Disconnect the high voltage wire B from the high voltage capacitor.
4. Remove one (1) screw holding earth side terminal of the high voltage rectifier assembly to the base plate through the capacitor holder.
5. Release the capacitor holder from the base plate.
8. Remove the high voltage capacitor from the capacitor holder.

7. Disconnect the high voltage rectifier assembly from the high voltage capacitor.
8. Now, the high voltage rectifier assembly and the high voltage capacitor should be free.

CAUTION: WHEN REPLACING HIGH VOLTAGE RECTIFIER ASSEMBLY, ENSURE THAT THE CATHODE (EARTH) CONNECTION IS SECURELY FIXED TO THE BASE PLATE THROUGH THE CAPACITOR HOLDER WITH AN EARTHING SCREW.

HIGH VOLTAGE TRANSFORMER REMOVAL

1. CARRY OUT 3D CHECKS.
2. Disconnect the main wire harness from the high voltage transformer.
3. Disconnect the filament leads and high voltage wire of high voltage transformer from high voltage capacitor and the magnetron.
4. Remove the two (2) screws and one (1) washer holding the transformer to the base plate.
5. Remove the transformer.
6. Now the high voltage transformer is free.

MAGNETRON REMOVAL

1. CARRY OUT 3D CHECKS.
2. Disconnect the H.V. wire B and filament lead of the transformer from the magnetron.
3. Carefully remove four (4) screws holding the magnetron to the waveguide, when removing the screws hold the magnetron to prevent it from falling.
4. Remove the magnetron from the waveguide with care so the magnetron antenna is not hit by any metal object around the antenna.
5. Remove the magnetron guide H from the magnetron.
6. Remove the one (1) screw holding the magnetron guide V to the magnetron.
7. Now, the magnetron is free.

CAUTION: WHEN REPLACING THE MAGNETRON, BE SURE THE R.F. GASKET IS IN PLACE AND THE MAGNETRON MOUNTING SCREWS ARE TIGHTENED SECURELY.

CONTROL PANEL ASSEMBLY REMOVAL

1. CARRY OUT 3D CHECKS.
2. Disconnect the wire leads and the connectors from the control unit.
3. Remove the one (1) screw holding the earth wire to the oven cavity face plate.
4. Lift up the control panel assembly and pull it forward. Now the control panel assembly is free.

NOTE:
1. Before attaching a new key unit, wipe off remaining adhesive on the control panel frame surfaces completely with a soft cloth soaked in alcohol.
2. When attaching the key unit to the control panel frame, adjust the upper edge and right edge of the key unit to the correct position of control panel frame.
3. Stick the key unit firmly to the control panel frame by rubbing with soft cloth not to scratch.

FAN MOTOR REPLACEMENT

REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the one (1) screw holding the noise filter to the chassis support.
3. Release the noise filter from the tabs of the fan duct.
4. Remove the four (4) screws holding the chassis support to the oven cavity front flange, back plate, air intake duct and the magnetron.
5. Remove the chassis support from the oven cavity.
6. Disconnect the wire leads from the fan motor.
7. Remove the one (1) screw holding the fan duct to the back plate.
8. Release the tabs of the fan duct from back plate.
9. Remove the fan duct from the oven.
10. Remove the fan blade from the fan motor shaft according to the following procedure.
    1) Hold the edge of the rotor of the fan motor by using a pair of groove joint pliers.

    CAUTION:
    - **Make sure that no swarf from the rotor enters the gap between the rotor & stator of the fan motor.**
    - **Avoid touch the coil of the fan motor with the pliers as the coil may become cut or damaged.**
    - **Avoid deforming the bracket whilst using the pliers.**

    2) Remove the fan blade assembly from the shaft of the fan motor by pulling and rotating the fan blade with your hand.
    3) Now, the fan blade is free.

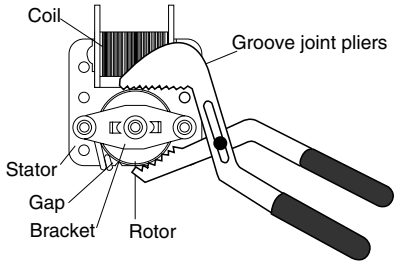
    CAUTION:
    - **Do not reuse the removed fan blade as the fixing hole may be oversize.**

11. Remove the two (2) screws holding the fan motor to the fan duct.
12. Now, the fan motor is free.

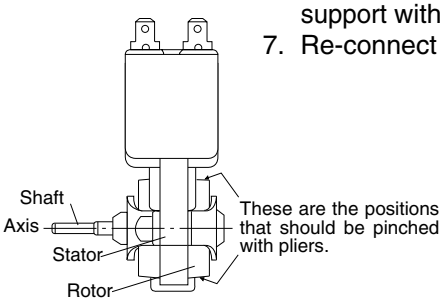
INSTALLATION

1. Install the the fan motor to the fan duct with the two (2) screws and nuts.
2. Install the fan blade to the fan motor shaft according to the following procedure.
    1) Hold the centre of the bracket which supports the shaft of the fan motor on a flat table.
    2) Apply the screw lock tight into the hole (for shaft) of the fan blade.
    3) Install the fan blade to the shaft of fan motor by pushing the fan blade with a small, light weight, rubber mallet.

CAUTION:
- **Do not hit the fan blade when installing because the bracket may be deformed.**
- **Make sure that the fan blade rotates smoothly after installation.**
- **Make sure that the axis of the shaft is not slanted.**

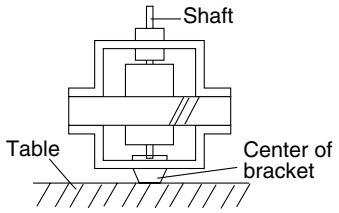


Rear view



Side view

3. Insert the tabs of the fan duct to the back plate.
4. Install the fan duct to the back plate with the one (1) screw.
5. Re-install the chassis support to the oven cavity with the four (4) screws.
6. Install the noise filter to the fan duct and the chassis support with the one (1) screw.
7. Re-connect the wire leads to the fan motor.



TURNTABLE MOTOR REPLACEMENT

Removal

1. Disconnect the oven from the power supply.
2. Remove the turntable and roller stay from the oven cavity.
3. Turn the oven over.
4. Cut the three (3) bridges holding the turntable motor cover to the base plate with cutting pliers as shown in Figure C-1(a).

CAUTION: DO NOT DROP THE TURNTABLE MOTOR COVER INTO THE OVEN AFTER CUTTING THE BRIDGES. BECAUSE IT WILL DAMAGE THE WIRE LEADS OF THE MOTOR AND IT IS DIFFICULT TO REMOVE IT OUT OF THE OVEN.

5. Remove the turntable motor cover from the base plate.
6. Disconnect the wire leads from the turntable motor.
7. Remove the two (2) screws holding the turntable motor to the oven cavity back plate.
8. Remove the turntable motor from the turntable motor angle. Now, the turntable motor is free.

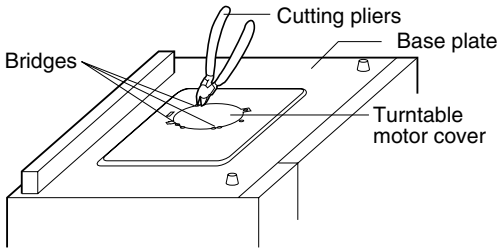


Figure C-1(a). Turntable motor cover removal

Re-install

1. Remove the any sharp edges on the turntable motor cover and the base plate with the cutting pliers.
2. Re-install turntable motor by locating shaft onto coupling to the oven cavity base plate with the two (2) screws.
3. Re-connect the wire leads to the turntable motor.
4. Insert the one (1) tab of the turntable motor cover into the slit of the base plate as shown in Figure C-1(b).
5. Re-install the turntable motor cover to the base plate with the screw (XHPSD40P08K00) as shown in Figure C-1(b).

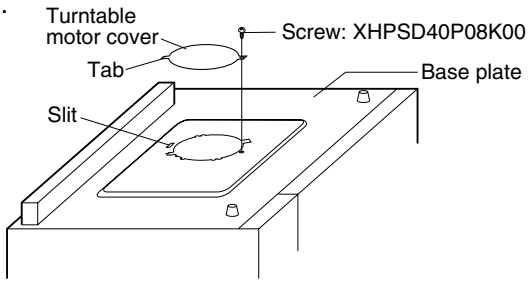


Figure C-1(b). Turntable motor cover re-install

CONVECTION MOTOR AND CONVECTION HEATING ELEMENT REMOVAL

1. CARRY OUT 3D CHECKS.
   Now,the outer case cabinet and the air duct should have been removed.
2. Remove the one (1) screw holding the earth wire of the power supply cord to the back plate.
3. Release the power supply cord from the back plate.
4. Remove the two (2) screws holding the rear barrier to the base plate.
5. Release the three (3) tabs of rear barrier from the base plate. And remove the rear barrier.
6. Remove the one (1) screw holding the back plate to the base plate.
7. Remove the one (1) screw holding the chassis support to the back plate.
8. Remove the one (1) screw holding the the back plate to the air intake duct.
9. Remove the two (2) screws holding the back plate to the convection duct.
10. Remove the back plate from the oven cavity.
11. Disconnect the wire leads from the convection heating elements, convection motor and thermal cut-out.
12. Remove the one (1) screw holding the convection duct to the oven cavity back plate from outside of the oven cvity.
13. Remove the seven (7) screws holding the convection duct to the oven cavity back plate from inside of the oven cvity.
14. Lift up the convection duct and release the three (3) tabs of the oven cavity back plate from the convection duct.
15. Now, the convection unit assembly is free.

CONVECTION HEATING ELEMENT REMOVAL

15. Remove the two (2) screws holding the convection heating element to the convection duct.
16. Remove the one (1) screw holding the convection heater angle to the convection duct.
17. Remove the one (1) screw holding the convection heater angle and the air separate angle D to the convection duct.
18. Remove the one (1) screw holding the convection heater angle A to the convection duct.
19. Remove the convection heating element from the convection duct.
20. Now, the convection heating element is free.

CONVECTION MOTOR REMOVAL

15. Remove the one (1) nut and washer from the convection motor shaft.
16. Remove the convection fan from the convection motor shaft.
17. Remove the pipe from the convection motor shaft.
18. Remove the two (2) screws holding the convection motor angle to the convection duct.
19. Remove the cooling fan from the convection motor shaft.
20. Remove the two (2) screws holding the convection motor to the convection motor angle.
21. Remove the one (1) ring from the convection motor shaft.
22. Now, the convection motor is free.

POSITIVE LOCK® CONNECTOR REMOVAL

1. CARRY OUT 3D CHECKS.
2. Push the lever of positive lock® connector.
3. Pull down on the positive lock® connector.

CAUTION: WHEN YOU (SERVICE ENGNEERS) CONNECT THE POSITIVE LOCK® CONNECTORS TO THE TERMINALS, CONNECT THE POSITIVE LOCK® SO THAT THE LEVER FACES YOU (SERVICE ENGNEERS).

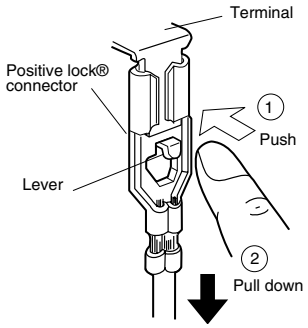


Figure C-2. Positive lock®connector

OVEN LAMP SOCKET REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the wire leads as Positive lock® connector removal above.
3. Lift up the oven lamp from its retaining clips by pushing the tab of the air intake duct.
4. Now, the oven lamp is free.

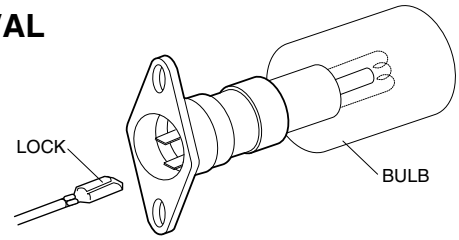


Figure C-3. Oven lamp

POWER SUPPLY CORD REPLACEMENT

Removal

1. CARRY OUT 3D CHECKS.
2. Remove the one (1) screw holding the green/yellow wire to the back plate.
3. Disconnect the leads of the power supply cord from the noise filter, referring to the Figure C-4(a).
4. Release the power supply cord from the rear cabinet.
5. Now, the power supply cord is free.

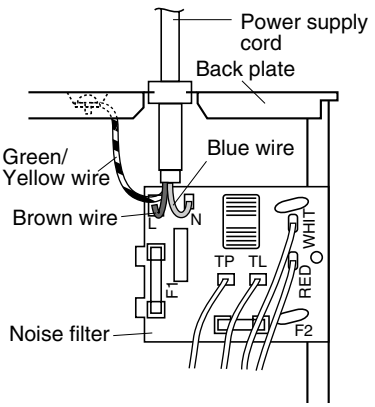


Figure C-4 (a) Replacement of Power Supply Cord

Re-install

1. Insert the moulding cord stopper of power supply cord into the square hole of the power angle, referring to the Figure C-4(b).
2. Install the earth wire lead of power supply cord to the back plate with one (1) screw and tight the screw.
3. Connect the brown and blue wire leads of power supply cord to the noise filter correctly, referring to the Pictorial Diagram.

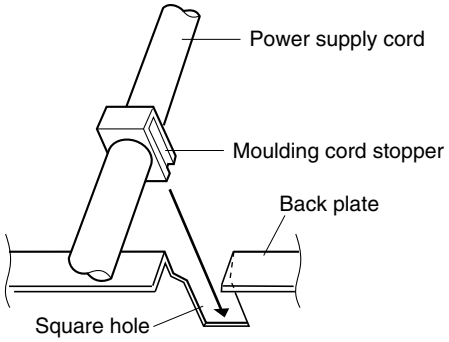


Figure C-4(b). Power Supply Cord Replacement

COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

GRILL HEATING ELEMENTS REMOVAL

1. CARRY OUT 3D CHECKS.
2. Disconnect wire leads from the thermal cut-out (GRILL).
3. Remove the two (2) screws holding the AH sensor assembly to the exhaust duct and remove the AH sensor assembly (only for R-963M)
4. Remove the two (2)screws holding the two (2) terminals of the main wire harness to the two (2) grill heating elements.
5. Remove the one (1) screw holding the exhaust duct to the oven cavity top plate.
6. Remove the exhaust duct from the oven cavity top plate.
7. By pushing the two (2) tabs holding the grill reflector to the oven cavity top plate, slide the grill reflector toward the magnetron. And then lift up the grill reflector and remove it.
8. Remove the one (1) screw holding the grill heater angle to the grill heater reflector.
9. Straighten the two (2) tabs of the grill heater angle and remove the grill heater angle from the grill reflector.
10. Remove the two (2) screws holding the earth plate to the two (2) grill heating elements.
11. Remove the two (2) grill heating elements from the grill reflector.
12. Now, the grill heating elements are free.

MONITORED LATCH SWITCH, MONITOR SWITCH AND STOP SWITCH REMOVAL

1. CARRY OUT 3D CHECKS.
2. Remove the control panel assembly referring to "CONTROL PANEL ASSEMBLY REMOVAL".
3. Disconnect the leads from all switches.
4. Remove the two (2) screws holding the latch hook to the oven cavity.
5. Remove the latch hook.
6. Remove the switch(es) from the latch hook by pushing the retaining tab backwards slightly and turning the switch(es) on the post.
7. Now the switch(es) is free.

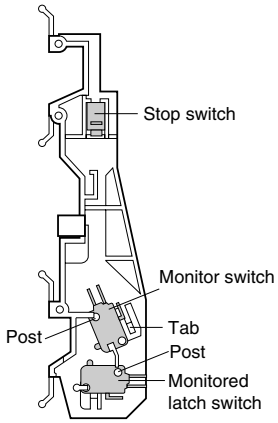


Figure C-5. Switches

MONITORED LATCH SWITCH, STOP SWITCH AND MONITOR SWITCH ADJUSTMENT

If the monitored latch switch, stop switch and monitor switch do not operate properly due to a mis-adjustment, the following adjustment should be made.

1. CARRY OUT 3D CHECKS.
2. Loosen the two (2) screws holding the latch hook to the oven cavity front flange.
3. With the door closed, adjust the latch hook by moving it back and forward or up and down. In and out play of the door allowed by the latch hook should be less than 0.5 mm. The horizontal position of the latch hook should be placed where the monitor switch has activated with the door closed. The vertical position of the latch hook should be placed where the monitored latch switch and stop switch have activated with the door closed.
4. Secure the screws with washers firmly.
5. Make sure of the all switches operation. If the latch head has not pushed the plungers of the monitor switch with door closed, adjust the latch hook position. At that time, the latch head should have pushed the plungers of the monitored latch switch and stop switch. If the latch head has not pushed the plungers of the monitored latch switch and stop switch with door closed, loose two (2) screws holding latch hook to oven cavity front flange and adjust the latch hook position.

After adjustment, make sure of following:

1. In and out play of door remains less than 0.5 mm when latched position. First check the latch hook position, pushing and pulling upper portion of the door toward the oven face. Then check the lower latch hook position, pushing and pulling lower portion of the door toward the oven face. Both results (play of the door) should be less than 0.5mm.
2. The stop switch interrupt the circuit before the door can be opened.
3. When the door is opened the contacts (COM-NC) of the monitor switch and monitored latch switch close. And the contacts (COM-NO) of their switches open.
4. When the door is closed the contacts (COM-NC) of the monitor switch and monitored latch switch open. And the contacts (COM-NO) of their switches close.
5. Re-install outer case and check for microwave leakage around the door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

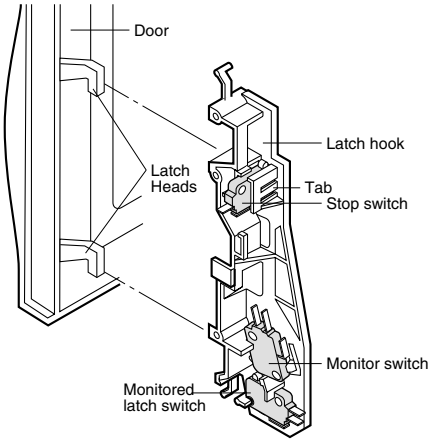


Figure C-6 Latch Switches Adjustment

COMPONENT REPLACEMENT AND ADJUSTMENT PROCEDURE

DOOR REPLACEMENT

REMOVAL

1. Disconnect the oven from the power supply.
2. Push the door slightly.
3. Remove the door stopper from the choke cover.
4. Lift the door upwards.
5. Now, door assembly is free from oven cavity.
6. Insert an putty knife (thickness of about 0.5mm) into the gap between the choke cover and door frame as shown in Figure C-7 to free engaging parts.
7. Release choke cover from door panel.
8. Now choke cover is free.

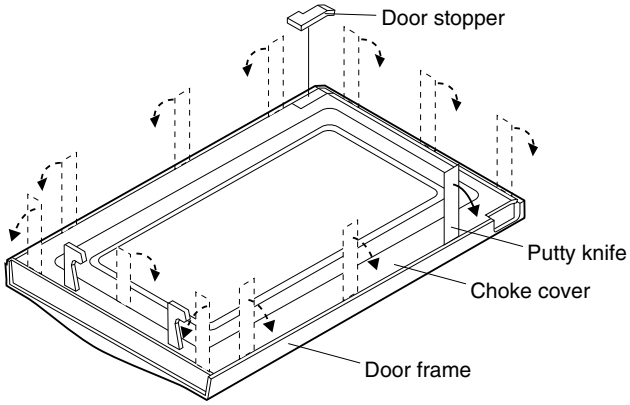


Figure C-7. Door Disassembly

DOOR PANEL

9. Remove the six (6) screws holding the door panel to the door frame.
10. Release door panel from door frame by lifting up the door panel.
11. Now, door panel is free.

LATCH HEAD AND SPRING

12. Slide latch head upward and remove it from door frame with releasing latch spring from door frame and latch head.
13. Now, latch head and latch spring are free.

DOOR HANDLE AND FRONT DOOR GLASS

14. Remove the two (2) screws holding the door handle to the door frame.
15. Remove the door handle from the door frame.
16. Slide the front door glass rightwards and then remove it.
17. Now, the front door glass is free

RE-INSTALL

1. Re-install the front door glass to the door frame as follows.
   a) Insert the front door glass into the door frame.
   b) Slide the front door glass leftwards.
2. Re-install the door handle to the door frame as follows.
   a) Insert the door handle to the door frame.
   b) Hold the door handle to the door frame with the two (2) screws.
3. Re-install the latch spring to the latch head. Re-install the latch spring to the door frame. Re-install latch head to door frame.
4. Re-install door panel to door frame.
5. Hold the door panel to the door frame with six (6) screws.
6. Re-install choke cover to door panel by clipping into position.
7. Locate door panel hinge pins into cavity hinge location holes.
8. Re-install the door stopper to the chock cover

Note: After any service to the door;

(A) Make sure that the monitor switch, monitored latch switch and stop switch are operating properly. (Refer to chapter "Test Procedures".).

(B) An approved microwave survey meter should be used to assure compliance with proper microwave radiation emission limitation standards. (Refer to Microwave Measurement Procedure.)

After any service, make sure of the following :

1. Door latch heads smoothly catch latch hook through latch holes and that latch head goes through centre of latch hole.
2. Deviation of door alignment from horizontal line of cavity face plate is to be less than 1.0mm.
3. Door is positioned with its face pressed toward cavity face plate.
4. Check for microwave leakage around door with an approved microwave survey meter. (Refer to Microwave Measurement Procedure.)

Note: The door on a microwave oven is designed to act as an electronic seal preventing the leakage of microwave energy from oven cavity during cook cycle. This function does not require that door be air-tight, moisture (condensation)-tight or light-tight. Therefore, occasional appearance of moisture, light or sensing of gentle warm air movement around oven door is not abnormal and do not of themselves, indicate a leakage of microwave energy from oven cavity.

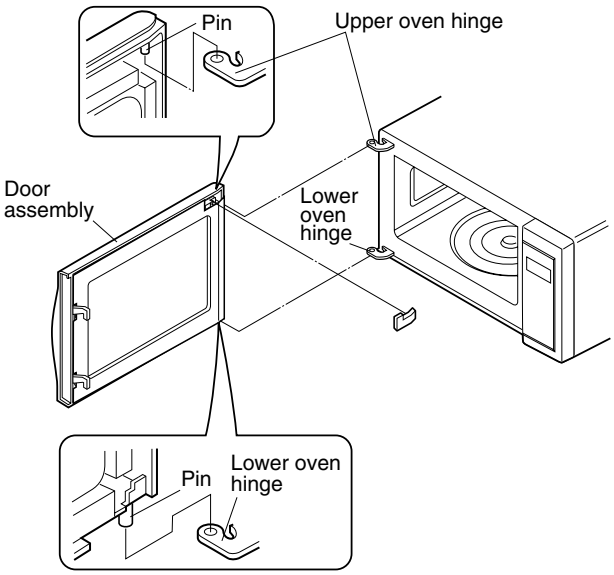


Figure C-8. Door Replacement

MICROWAVE MEASUREMENT

After any repair, the microwave oven must be checked for microwave leakage to ensure continued safe operation. BS EN 60335-2-25 specifies that the maximum permitted leakage with a load of 275 ml is 50 W/m^2 (equivalent to 5 mW/cm^2) at a distance of 5 cm from the oven.

PREPARATION

The following items are required to carry out this test:-

1. A low form of 600 ml beaker made from an electrically non-conductive material, such as glass or plastic, with an inside diameter of approximately 8.5 cm. This must contain 275 ± 15 ml of water, at an initial temperature of 20 ± 2˚C.
2. A leakage detector which has been calibrated within the preceding 12 months to a stand whose accuracy can be traced to National Physical Laboratory Standards.

   Recommended instruments are:

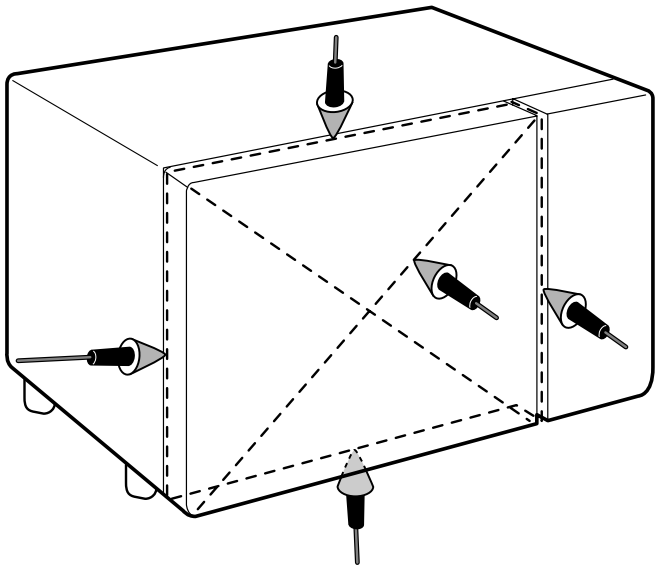
   Apollo "XI"
   Celtec "A100"

Before commencing the test, check that the leakage detector is functioning and adjusted according to the manufacturer's instructions, and any spacers are fitted to ensure that measurement is taken 5cm from the surface of the oven.

PROCEDURE

1. Place the beaker containing the water load in the oven cavity at the centre of the turntable. The placing of this standard load in the oven is important, not only to protect the oven, but also to ensure that any leakage it is not disguised by too large a load absorbing energy.
2. Close the oven door, and with the power level set to FULL, turn the oven ON with the timer set for a few minutes operation. Should the water begin to boil before the test has been completed, it should be replaced.
3. As shown in the diagram below, move the probe slowly (not faster than 2.5 cm/sec.);-

a) around the edge of the door following the gap
b) across the face of the door
c) across any vents in the oven's sides, rear or top



Dotted line indicates the path taken by the leakage detector.

Whilst the maximum leakage permitted in BS EN 60335-2-25 is 50 W/m^2 (equivalent to 5 mW/cm^2), it is not normal to detect any significant leakage, and therefore any detected leakage should be investigated.

SCHEMATIC DIAGRAMS

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR CLOSED.
2. PLUGGED IN OVEN.
3. NOTHING APPEARS ON DISPLAY.

Note:
AC CORD CONNECTION
BRN : BROWN
BLU : BLUE
G-Y : GREEN AND YELLOW STRIPE
/15 : SECTIONAL AREA OF 1.5mm^2 MIN.
"★" Indicates components with potential above 250 V.

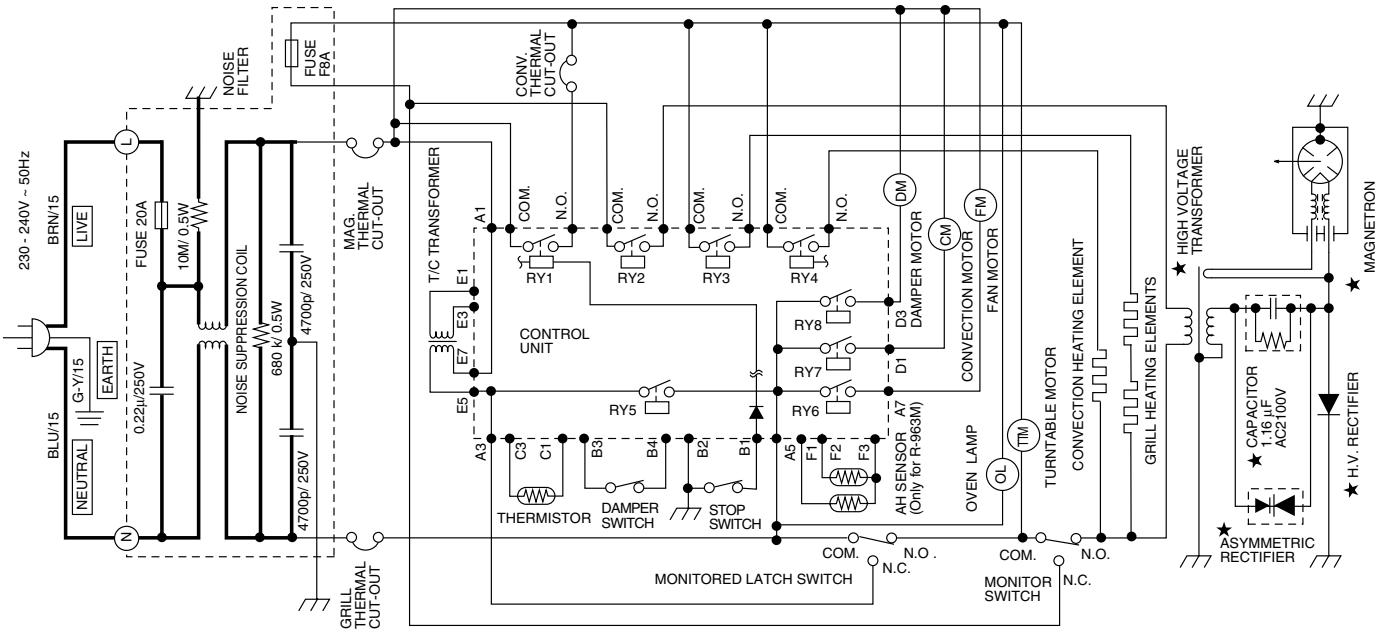


Figure O-1(a) Oven Schematic-OFF Condition right after the oven is plugged in.

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR OPENED.
2. "ENERGY SAVED MODE" APPEARS ON DISPLAY.

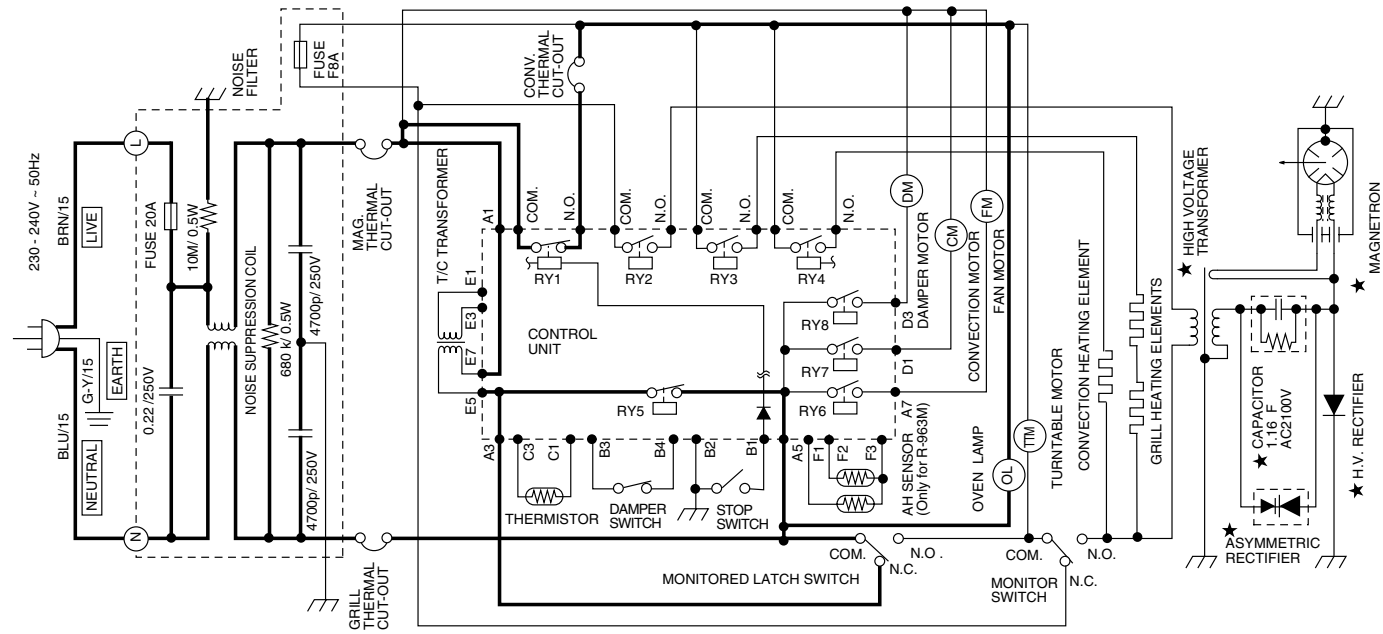


Figure O-1(b) Oven Schematic-OFF Condition when the oven door is opened.

SCHEMATIC DIAGRAMS

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR CLOSED.
2. " . O" APPEARS ON DISPLAY.

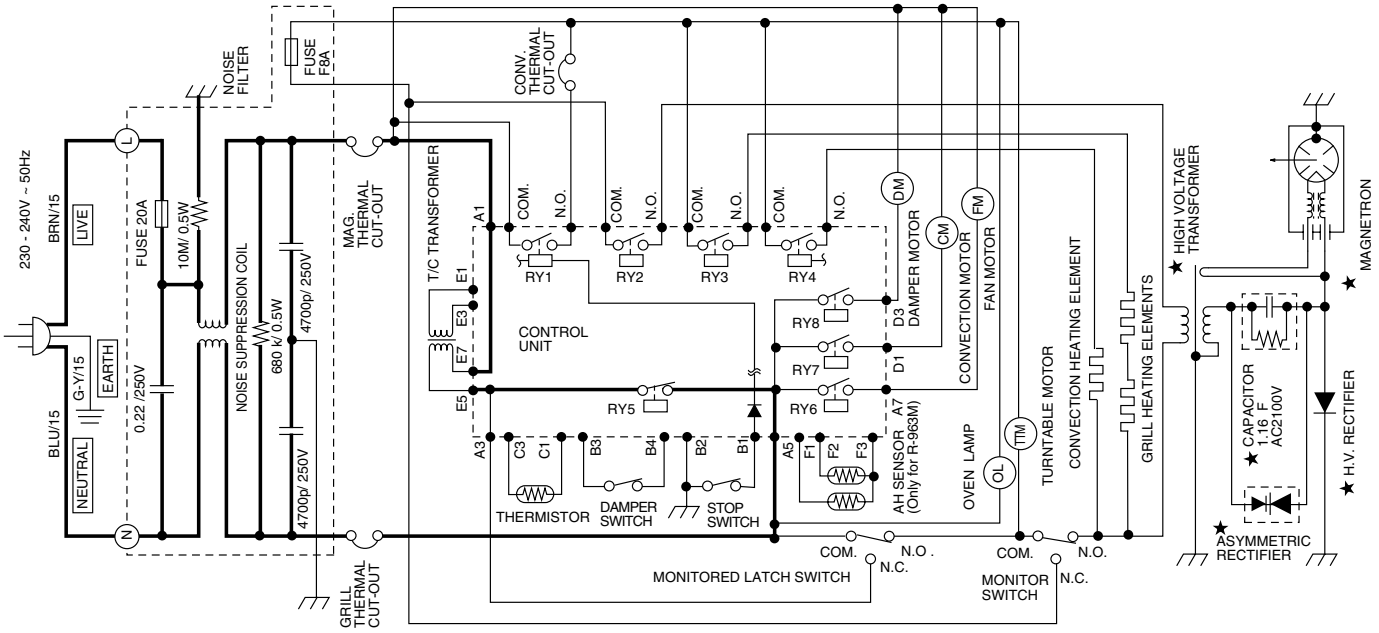


Figure O-1(c) Oven Schematic-OFF Condition after the oven door is closed.

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR CLOSED.
2. COOKING TIME ENTERED.
3. STRAT KEY TOUCHED.

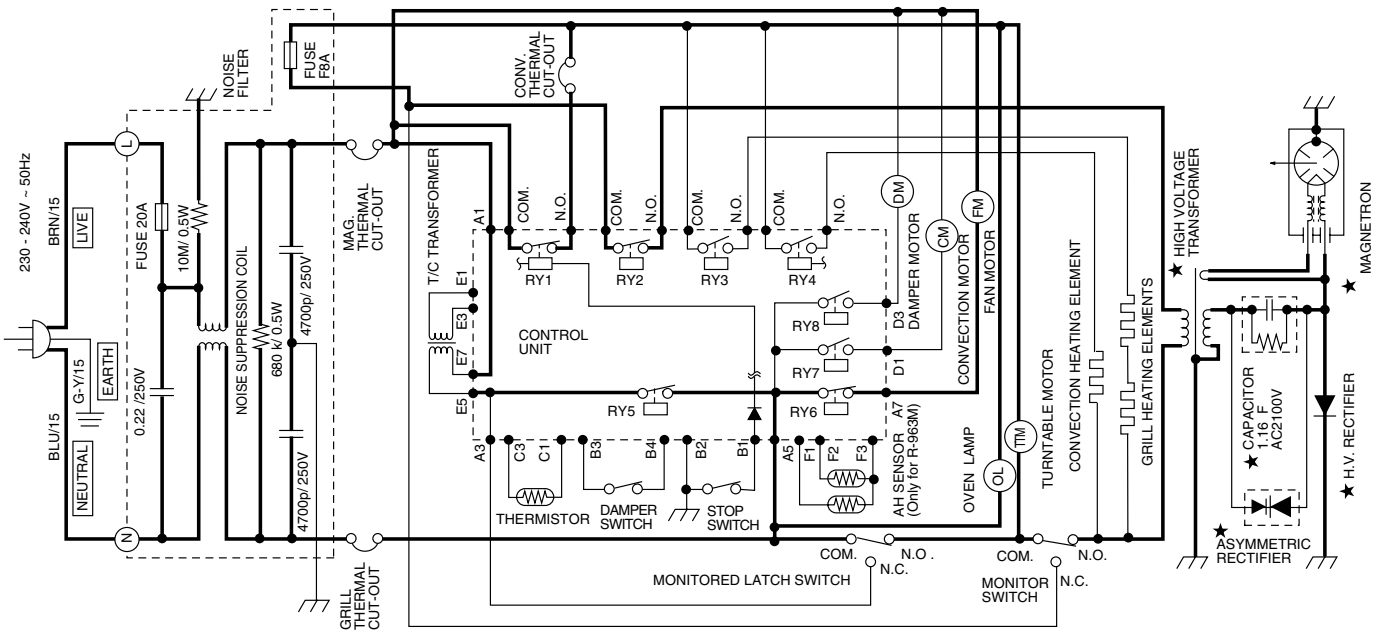


Figure O-2 Oven Schematic-Microwave cooking Condition

SCHEMATIC DIAGRAMS

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR CLOSED.
2. COOKING TIME ENTERED.
3. GRILL MODE SELECTED.
4. STRAT KEY TOUCHED.

NOTE: The convection heater will be operational as back up until the oven cavity temperature rises to 220 ˚C.

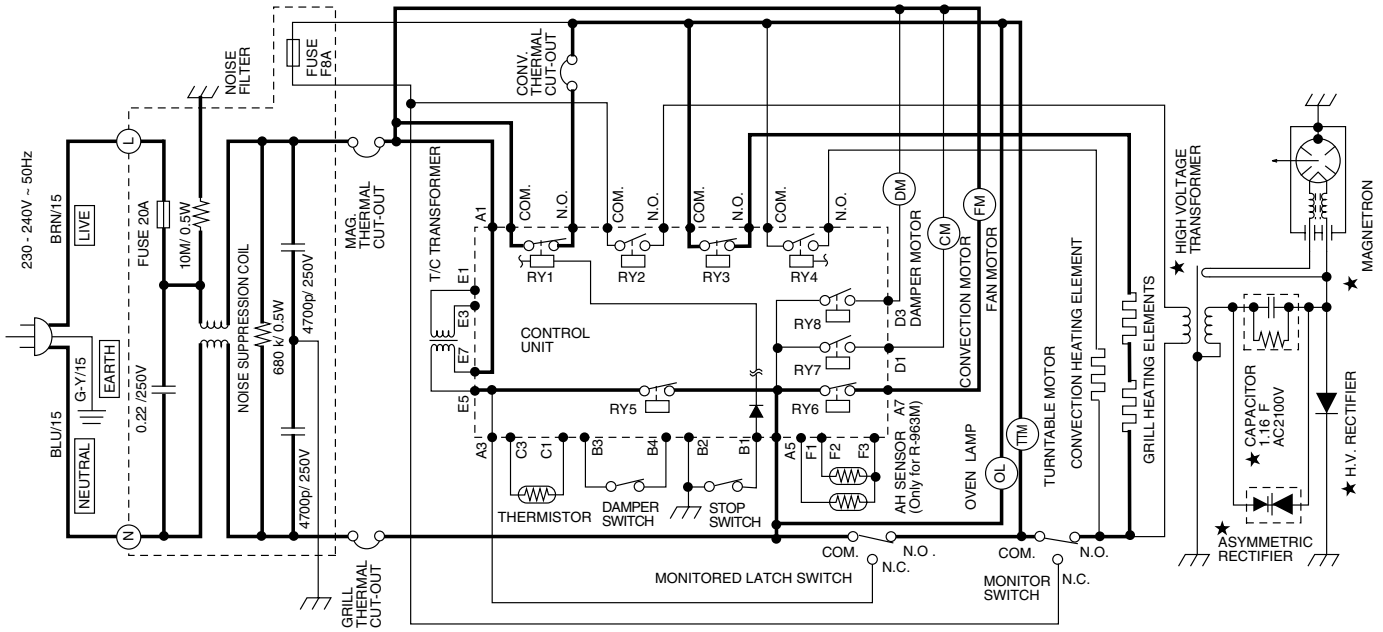


Figure O-3 Oven Schematic-Grill cooking Condition (TOP GRILL mode)

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR CLOSED.
2. COOKING TIME ENTERED.
3. CONVECTION TEMPERATURE SELECTED.
4. STRAT KEY TOUCHED.

NOTE: When the convection temperature 160 - 250 ˚C are selected, the grill heating element will be energized as back up.

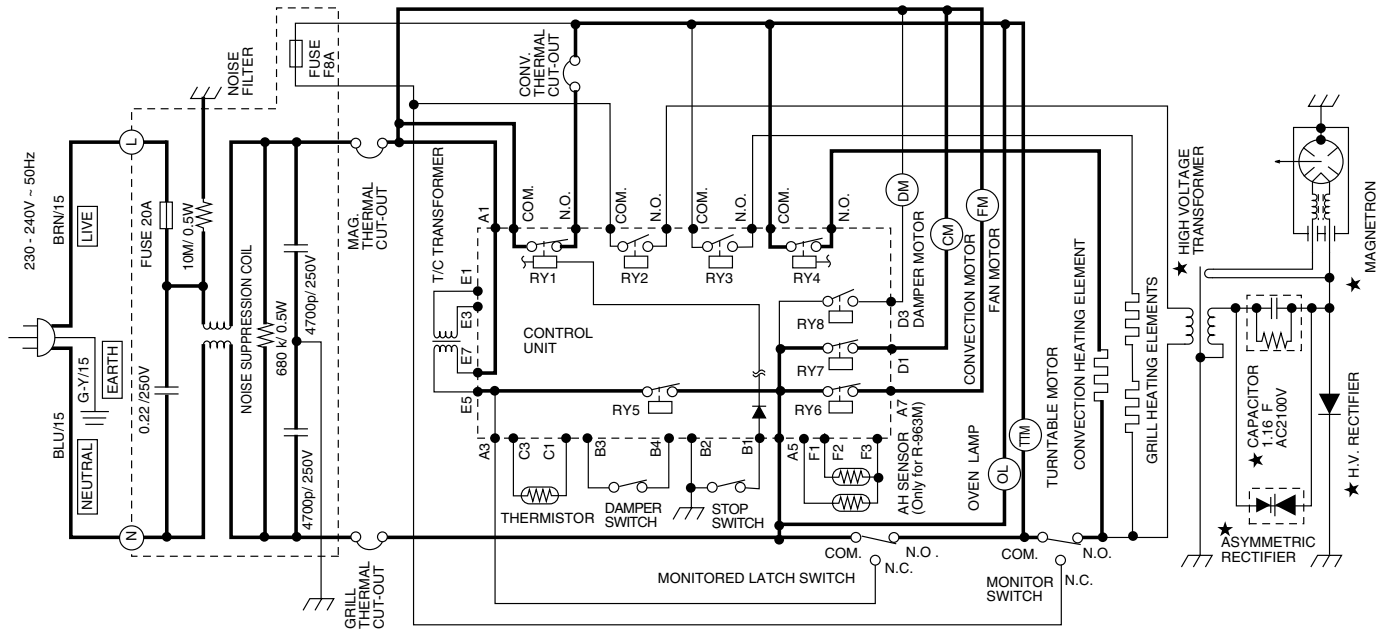


Figure O-4 Oven Schematic-Convection Condition

SCHEMATIC DIAGRAMS

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR CLOSED.
2. COOKING TIME ENTERED.
3. DUAL CONV./GRILL PAD TOUCHED ONCE.
4. CONVECTION TEMPERATURE SELECTED.
5. MICROWAVE POWER LEVEL SELECTED.
6. STRAT KEY TOUCHED.

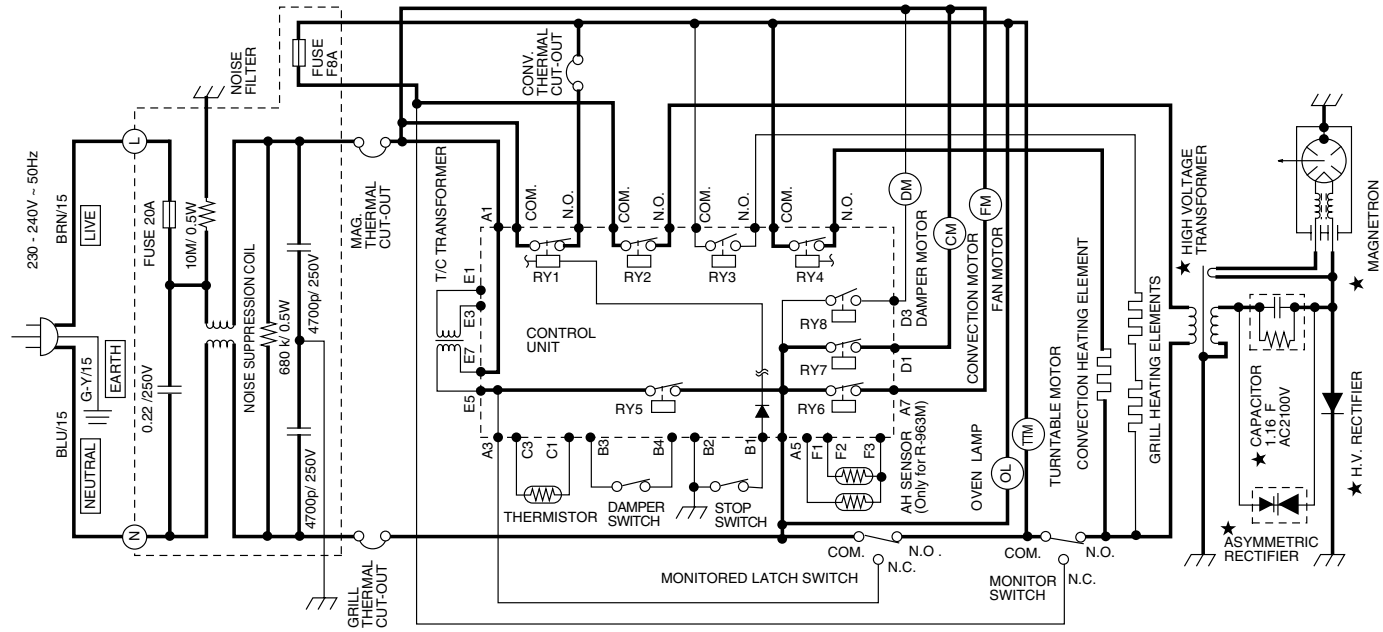


Figure O-5(a) Oven Schematic-Dual cooking Condition (Microwave and Convection)

SCHEMATIC
NOTE: CONDITION OF OVEN
1. DOOR CLOSED.
2. COOKING TIME ENTERED.
3. DUAL CONV./GRILL PAD TOUCHED TWICE.
4. MICROWAVE POWER LEVEL SELECTED.
5. STRAT KEY TOUCHED.

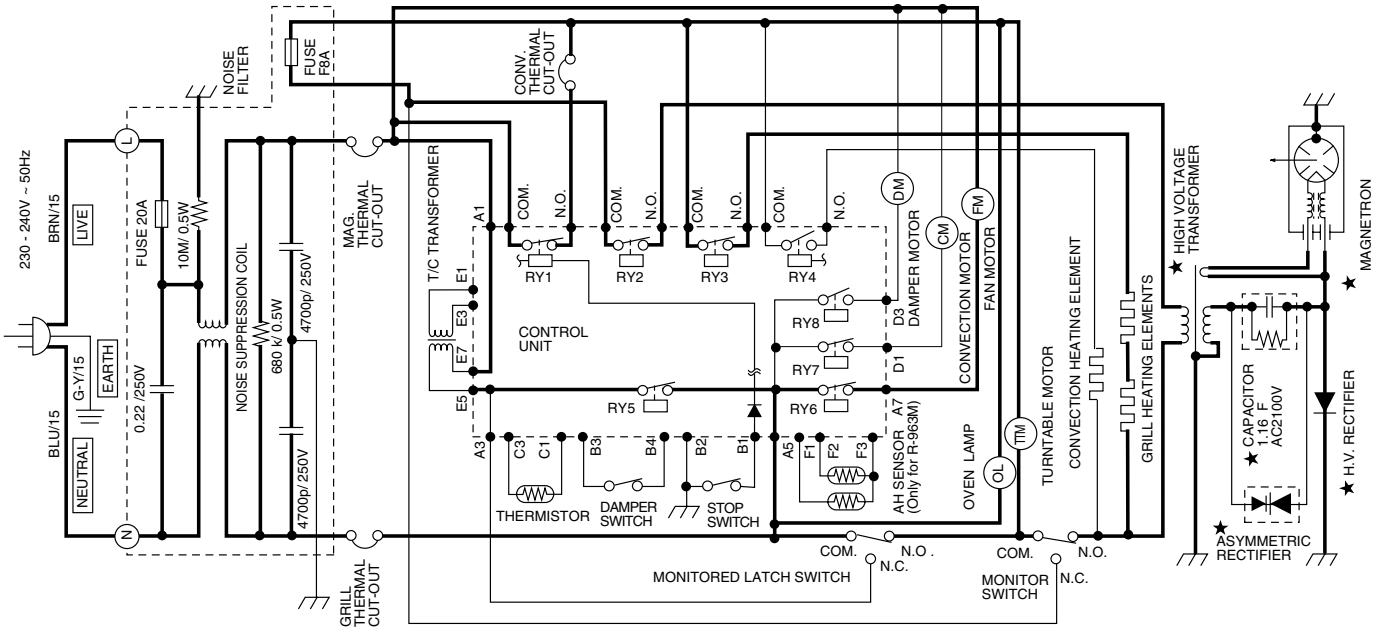


Figure O-5(b) Oven Schematic-Dual cooking Condition (Microwave and Grill)

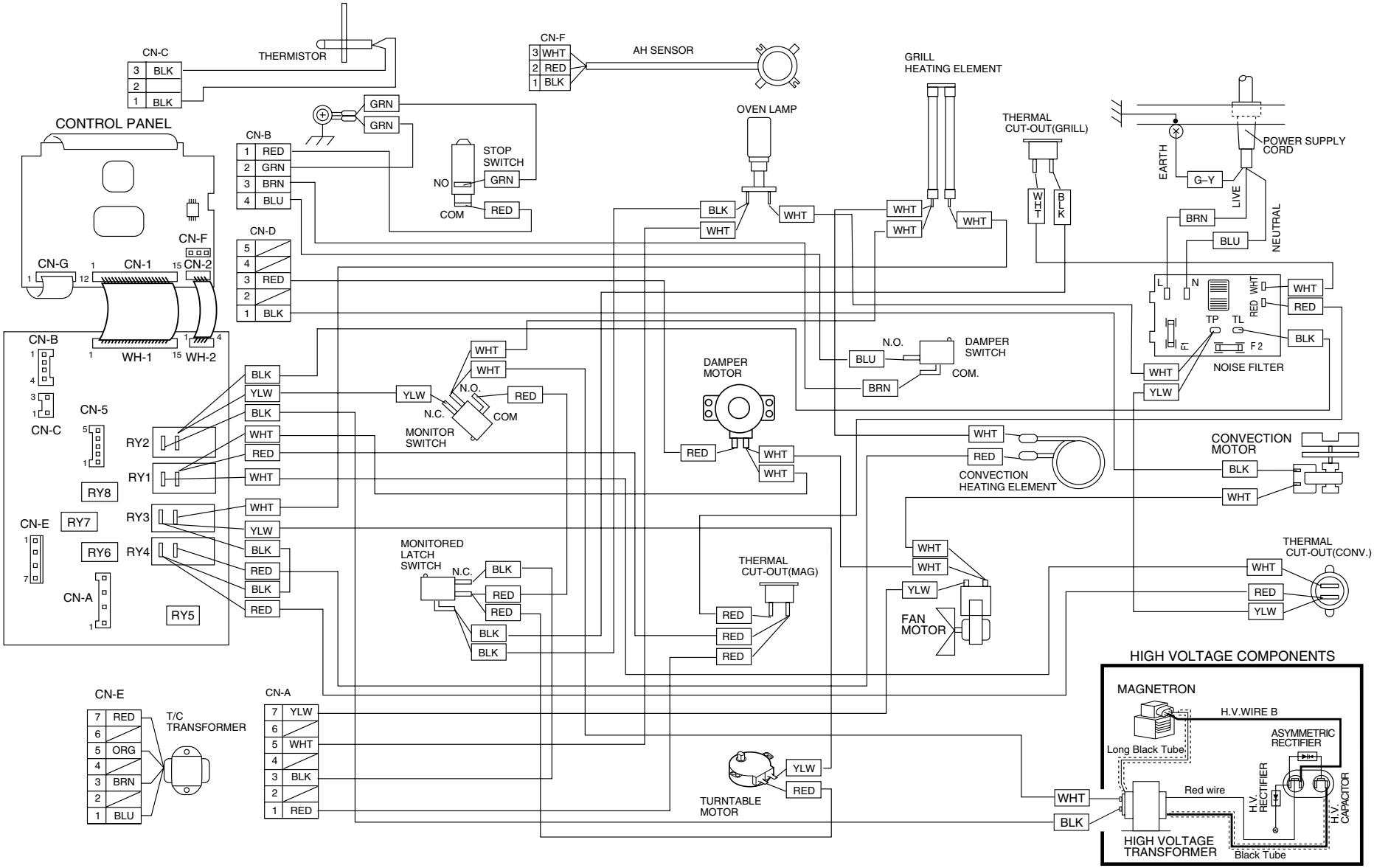


Figure S-1. Pictrorial Diagram

POWER UNIT CIRCUIT

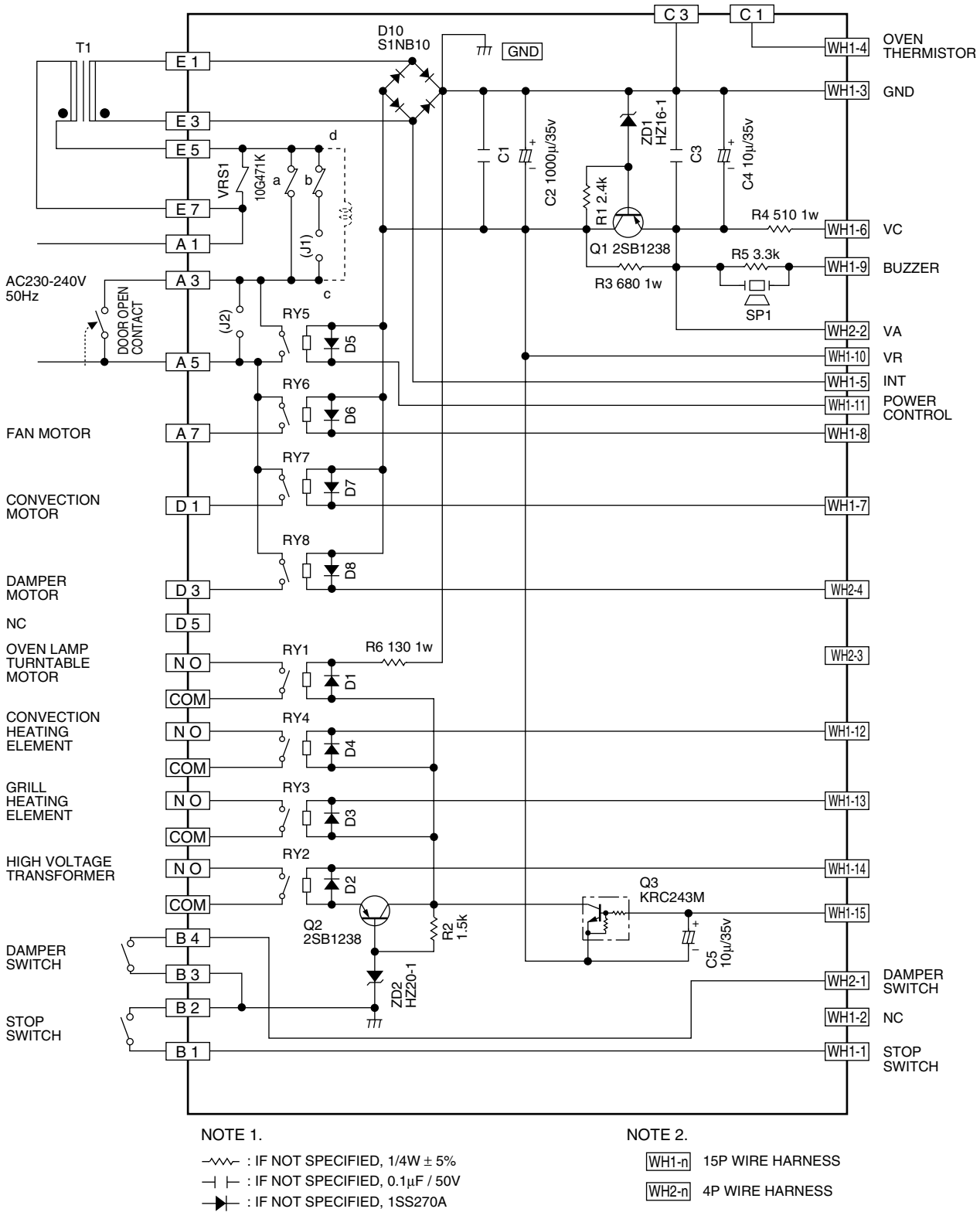


Figure S-2. Power Unit Circuit

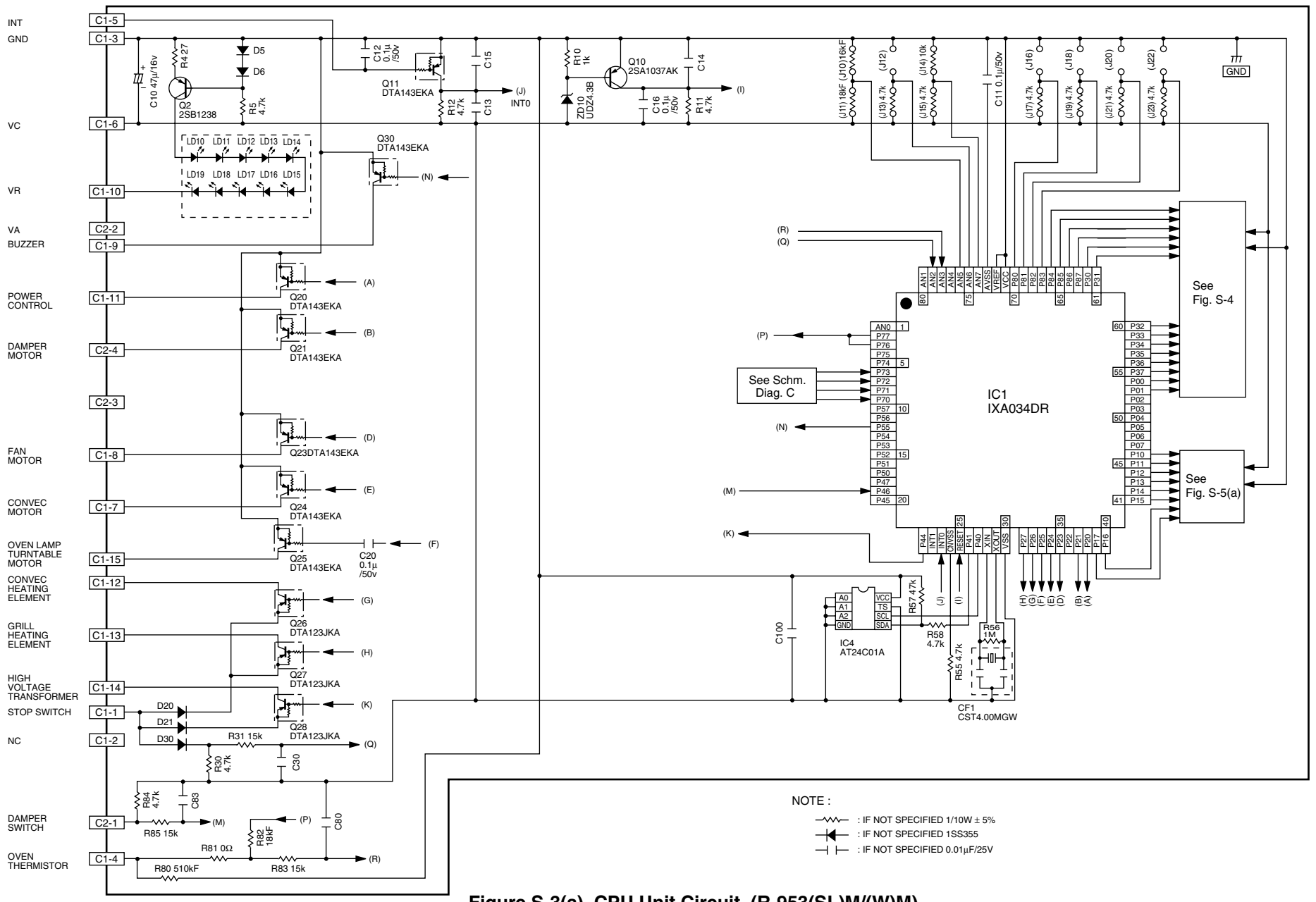


Figure S-3(a). CPU Unit Circuit (R-953(SL)M/(W)M)

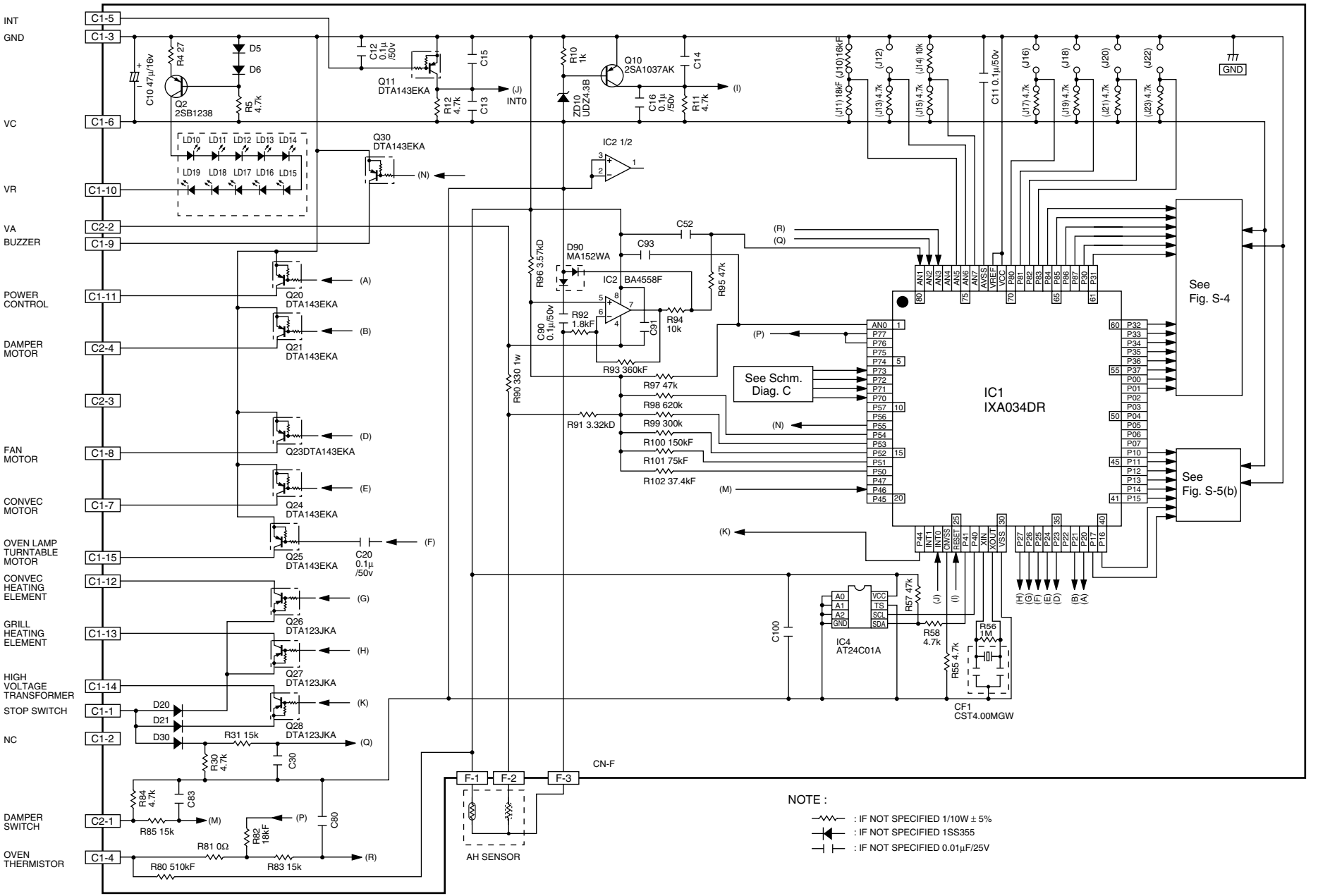


Figure S-3(b). CPU Unit Circuit (R-963(SL)M/(W)M)

INDICATOR CIRCUIT

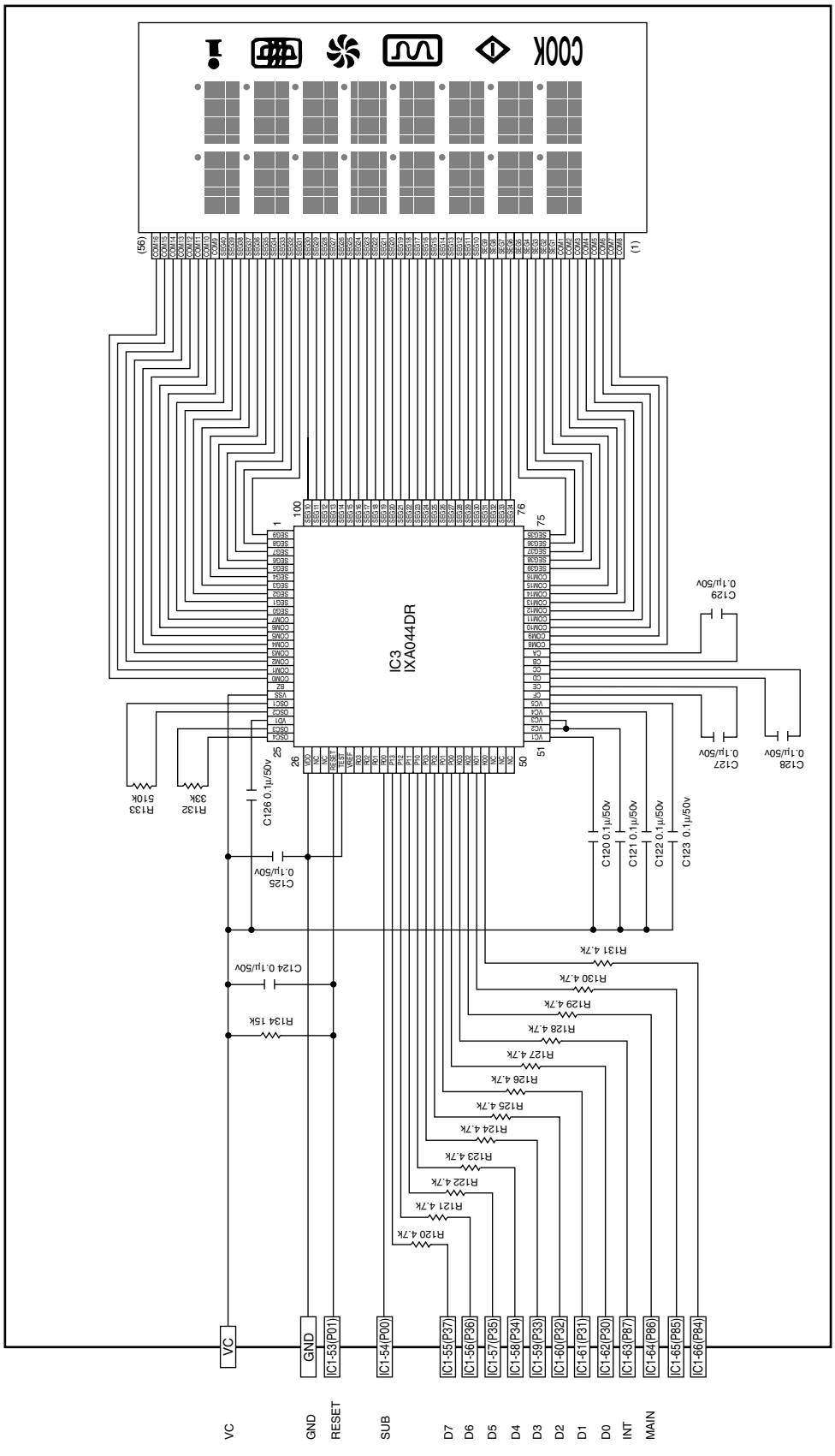


Figure S-4. Indicator Circuit

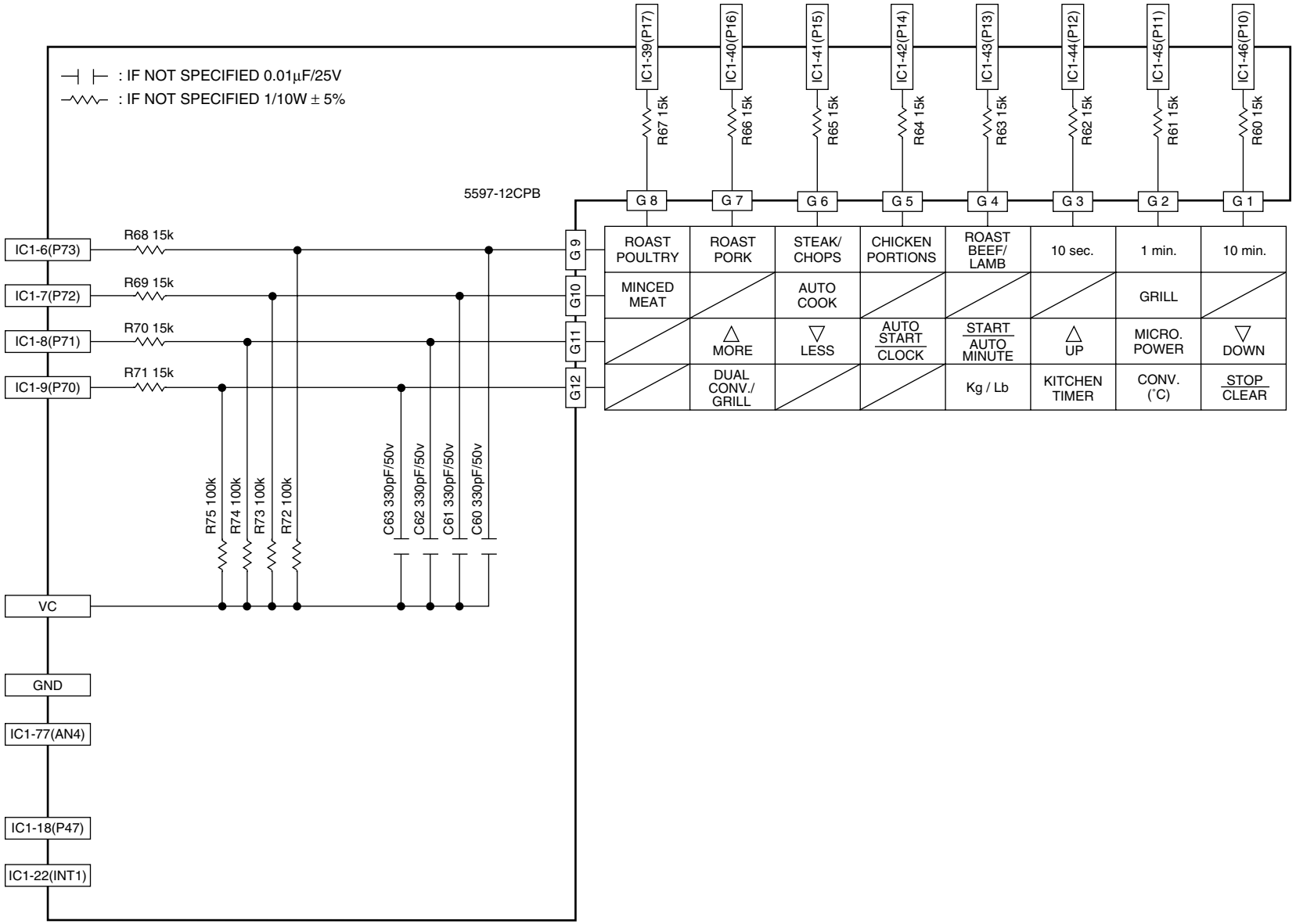


Figure S-5(a). Key Unit Circuit (R-953(IN)M/(W)M)

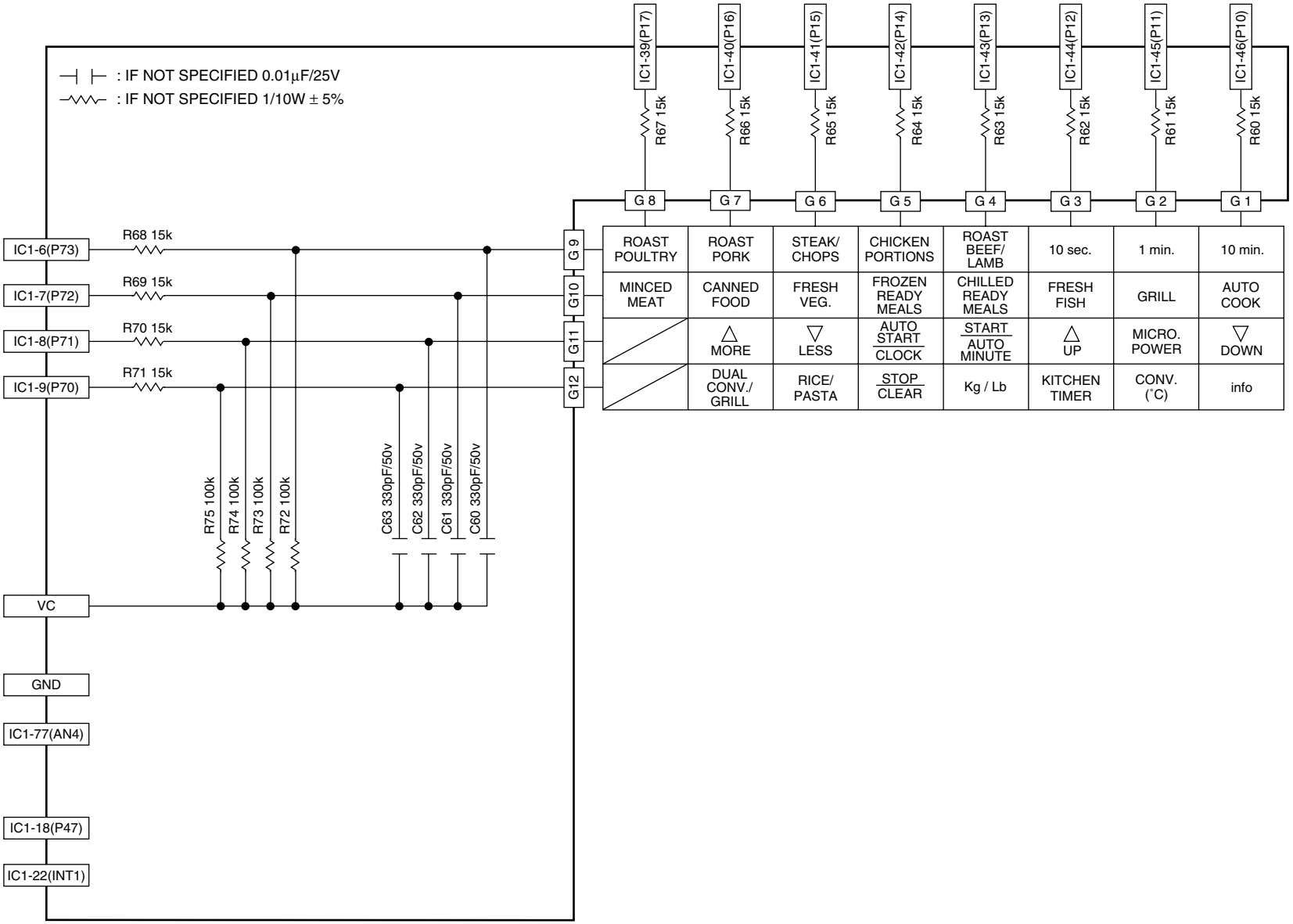


Figure S-5(b). Key Unit Circuit (R-963(IN)M/(W)M)

PRINTED WIRING BOARD POWER UNIT

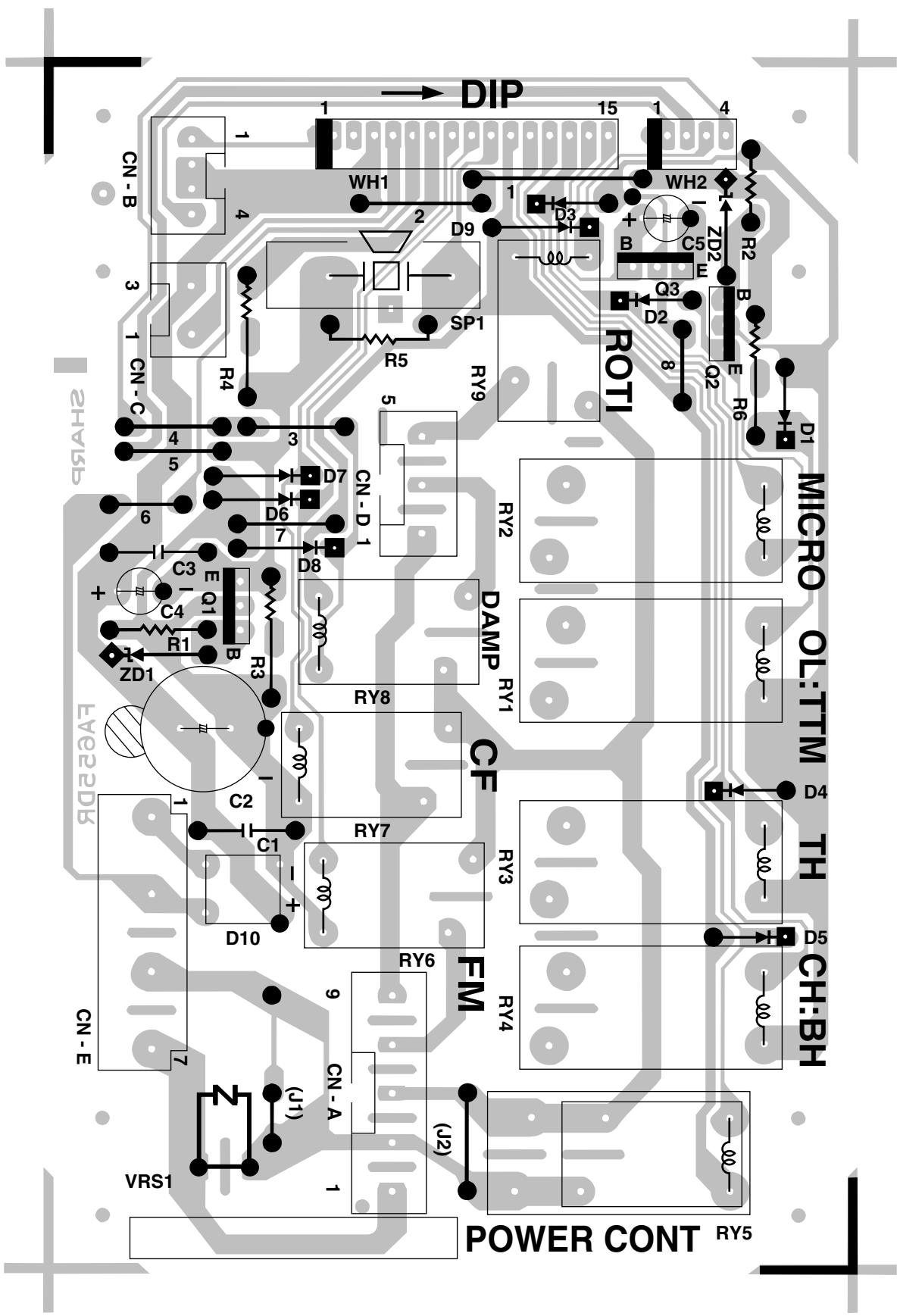


Figure S-6. Printed Wiring Board of Power Unit

PARTS LIST

Note: The parts marked "Δ" may cause undue microwave exposure. / The parts marked "*" are used in voltage more than 250V. / "§" Mark: Spare parts delivery section

	REF. NO.	PART NO.	§	DESCRIPTION	Q'TY	CODE
	ELECTRIC PARTS					
	1- 1	QSW-MA133WRE0	U	Monitored latch switch	1	AN
	1- 2	QSW-MA131WRE0	U	Stop switch	1	AK
	1- 3	QSW-MA133WRE0	U	Monitor switch	1	AN
	1- 4	QSW-MA131WRE0	U	Damper switch	1	AG
	1- 5	QFS-BA009WRE0	U	Fuse 20A	1	AC
	1- 6	QFS-CA025WRE0	U	Fuse F8A	1	AC
	1- 7	RTHM-A098WRE0	U	Thermal cut-out 125˚C(MG)	1	AH
	1- 8	RTHM-A109WRE0	J	Thermal cut-out 170˚C (GRILL)	1	AG
	1- 9	RTHM-A109WRE0	J	Thermal cut-out 170˚C (CONV.)	1	AG
*	1-10	RC-QZA219WRE0	U	High voltage capacitor	1	AT
*	1-11	FH-DZA035WRE0	U	High voltage rectifier assembly	1	AP
Δ*	1-12	RV-MZA264WRE0	U	Magnetron	1	BK
*	1-13	RTRN-A016URE1	U	High voltage transformer	1	BE
	1-14	RHET-A231WRZZ	U	Grill heating element	2	AQ
	1-15	RHET-A233WRZZ	U	Convection heating element	1	AU
	1-16	RMOTEA361WRE0	U	Fan motor	1	AT
	1-17	RMOTEA373WRE0	U	Convection motor	1	AV
	1-18	RMOTDA227WRE0	U	Turntable motor	1	AU
	1-19	RMOTDA191WRE0	J	Damper motor	1	AS
	1-20	RLMPTA066WRE0	U	Oven lamp	1	AK
	1-21	QACCBA004URE1	U	Power supply cord	1	AT
	1-22	FPWBFA309WRE2	U	Noise filter	1	AT
	1-23	RTRN-A529WRE0	U	TC transformer	1	AV
	1-24	FH-HZA075WRE0	U	Thermistor	1	AN
	1-25	FDTCTA208WRKZ	U	AH sensor assembly [R-963(SL)M/(W)M]	1	AW
	CABINET PARTS					
	2- 1	GCABDA005URP0	U	Back plate	1	AU
	2- 2	GCABUA038URP0	U	Outer case cabinet [R-963(SL)M, R-953(SL)M]	1	AU
	2- 2	GCABUA037URP0	U	Outer case cabinet [R-963(W)M, R-953(W)M]	1	AU
	2- 3	GLEGPA028WRE0	U	Foot	2	AA
	2- 4	GDAI-A003URP0	U	Base plate	1	AT
	CONTROL PANEL PARTS					
	3- 1	DPWBFA129URK0	U	Power unit	1	BF
	3- 1A	QCNCMA412DRE0	U	4-pin connector (CN-A)	1	AD
	3- 1B	QCNCMA433DRE0	U	4-pin connector (CN-B)	1	AM
	3- 1C	QCNCMA410DRE0	U	2-pin connector (CN-C)	1	AB
	3- 1D	QCNCMA430DRE0	U	3-pin connector (CN-D)	1	AC
	3- 1E	QCNCMA230DRE0	U	4-pin connector (CN-E)	1	AC
	3- 1F	FW-VZA266DREZ	U	15-pin wire harness (WH-1)	1	AE
	3- 1G	FW-VZA267DREZ	U	4-pin wire harness (WH-2)	1	AC
	C1	RC-KZA087DRE0	U	Capacitor 0.1 uF 50V	1	AB
	C2	VCEAG31VW108M	U	Capacitor 1000 uF 35V	1	AE
	C3	RC-KZA087DRE0	U	Capacitor 0.1 uF 50V	1	AB
	C4-5	VCEAG31VW106M	U	Capacitor 10 uF 35V	2	AB
	D1-8	VHD1SS270A/-1	U	Diode (1SS270A)	8	AA
	D10	RSRCDA013DRE0	U	Diode bridge (S1NB10)	1	AE
	Q1-2	VS2SB1238//-3	U	Transistor (2SB1238)	2	AD
	Q3	VSKRC243M//-3	U	Transistor (KRC243M)	1	AB
	R1	VRD-B12EF242J	U	Resistor 2.4K ohm 1/4W	1	AA
	R2	VRD-B12EF152J	U	Resistor 1.5K ohm 1/4W	1	AA
	R3	VRS-B13AA681J	U	Resistor 680 ohm 1W	1	AB
	R4	VRS-B13AA511J	U	Resistor 510 ohm 1W	1	AB
	R5	VRD-B12EF332J	U	Resistor 3.3K ohm 1/4W	1	AA
	R6	VRS-B13AA131J	U	Resistor 130 ohm 1W	1	AB
	RY1	RRLY-A117DRE0	U	Relay (DU18D1-1P(M)-R)	1	AG
	RY2	RRLY-A122DRE0	U	Relay (DU18D1-1P(M)-R-S)	1	AG
	RY3-4	RRLY-A113DRE0	U	Relay (DU24D1-1P(M)-R)	2	AG
	RY5-8	RRLY-A080DRE0	U	Relay (OJ-SH-124LM)	4	AG
	SP1	RALM-A014DRE0	U	Buzzer (PKM22EPT)	1	AG
	VRS1	RH-VZA034DRE0	U	Varistor (10G471K)	1	AD
	ZD1	VHEHZ161///-1	U	Zener diode (HZ16-1)	1	AB
	ZD2	VHEHZ201///-1	U	Zener diode (HZ20-1)	1	AB
	3- 2	DPWBFC035WRKZ	U	CPU unit [R-963(SL)M]	1	BC
	3- 2	DPWBFC035WRKZ	U	CPU unit [R-963(W)M]	1	BC
	3- 2	DPWBFC036WRKZ	U	CPU unit [R-953(SL)M]	1	BC
	3- 2	DPWBFC036WRKZ	U	CPU unit [R-953(W)M]	1	BC
	3- 3	LHLD-A010URF0	U	LED holder	1	AM
	3- 4	PSHEPA647WRE0	U	LCD sheet	1	AL
	3- 5	FUNTKC101URE0	U	Key unit [R-953(SL)M]	1	AS
	3- 5	FUNTKC101URE0	U	Key unit [R-953(W)M]	1	AS

PARTS LIST

Note: The parts marked "Δ" may cause undue microwave exposure. / The parts marked "*" are used in voltage more than 250V. / "§" Mark: Spare parts delivery section

	REF. NO.	PART NO.	§	DESCRIPTION	Q'TY	CODE
	3- 5	FUNTKC102URE0	U	Key unit [R-963(W)M]	1	AS
	3- 5	FUNTKC103URE0	U	Key unit [R-963(SL)M]	1	AS
	3- 6	GCOVHA023URF0	U	Key fixing frame	1	AL
	3- 7	HDECQK001URF0	U	Panel sash [R-953(SL)M]	1	AR
	3- 7	HDECQK001URF0	U	Panel sash [R-963(SL)M]	1	AR
	3- 7	HDECQS001URT0	U	Panel sash [R-953(W)M]	1	AR
	3- 7	HDECQS001URT0	U	Panel sash [R-963(W)M]	1	AR
	3- 8	HPNLCS016URT0	U	Control panel frame [R-953(SL)M]	1	AU
	3- 8	HPNLCS016URT0	U	Control panel frame [R-963(SL)M]	1	AU
	3- 8	HPNLCW052URF0	U	Control panel frame [R-953(W)M]	1	AU
	3- 8	HPNLCW052URF0	U	Control panel frame [R-963(W)M]	1	AU
	3- 9	XEPSD30P10XS0	U	Screw : 3mm x 10mm	2	AA
	OVEN PARTS					
	4- 1	PSKR-A011URP0	U	Magnetron guide H	1	AN
	4- 2	PCUSUA026URP0	U	Heat cover cushion	1	AB
Δ	4- 3	PSKR-A009URP0	U	Magnetron guide V	1	AG
	4- 4	DOVN-A018URK0	U	Oven cavity	1	BL
	4- 5	MCAMPA001URF0	U	Damper cam	1	AD
	4- 6	LANGTA009URP0	U	Damper angle	1	AC
	4- 7	PFTA-A001URF0	U	Damper	1	AD
	4- 8	PCUSUA025URP0	U	VJC damper cushion	1	AC
	4- 9	PDUC-A011URF0	U	Air intake duct	1	AE
	4-10	PDUC-A014URP0	U	Exhaust duct [R-953(SL)M/(W)M]	1	AM
	4-10	PDUC-A015URP0	U	Exhaust duct [R-963(SL)M/(W)M]	1	AM
	4-11	PSKR-A010URP0	U	Partition plate B	1	AD
	4-12	PDUC-A012URP0	U	Air duct	1	AG
	4-13	LANGQA017URP0	U	Grill heater angle	1	AB
	4-14	QTANNA001URP0	U	Earth plate	1	AB
	4-15	PREFHA001URP0	U	Grill reflector	1	AN
	4-16	LANG-A054WRP0	U	Convection heater angle	2	AB
	4-17	LANGQA308WRP0	U	Convection motor angle	1	AE
	4-18	NFANMA003URP0	U	Cooling fan	1	AD
	4-19	PDUC-A013URP0	U	Convection duct	1	AB
	4-20	PPIPFA013WRE0	U	Pipe	1	AE
	4-21	PSKR-A002URP0	U	Air separate angle A	1	AC
	4-22	PSKR-A003URP0	U	Air separate angle B	1	AC
	4-23	PSKR-A004URP0	U	Air separate angle C	1	AC
	4-24	PSKR-A005URP0	U	Air separate angle D	2	AC
	4-25	PSLDHA001URP0	U	Rear heat cover	1	AM
	4-26	LANGQA018URP0	U	Convection heater angle A	1	AM
	4-27	PFPF-A002URE0	U	Heat insulatiing material	1	AL
	4-28	PSKR-A006URP0	U	Air separate angle E	1	AC
	4-29	PSKR-A007URP0	U	Air separate angle F	1	AC
Δ	4-30	NFANMA011WRP0	J	Convection fan	1	AD
	4-31	PHOK-A0002URF0	U	Latch hook	1	AG
	4-32	PDUC-A016URF0	U	Fan duct	1	AL
	4-33	NFANJA038WRE0	U	Fan blade	1	AF
	4-34	GCOVHA002URP0	U	Bottom heater cover	1	AB
	4-35	LANGFA001URP0	U	Chassis support	1	AB
	4-36	NCPL-A040WRE1	U	Coupling	1	AP
*	4-37	PCOVPA309WRE0	U	Waveguide cover	1	AC
	4-38	PFPF-A003URE0	U	Heat insulatiing material	1	AM
*	4-39	PFILWA001URP0	U	Lamp filter	1	AB
	4-40	PPACGA101WRE0	U	O-ring	1	AB
	4-41	PSLDHA002URP0	U	Heater cover right	1	AM
	4-42	PSPAGA001WRE0	U	Vibration proof cushion	1	AA
	4-43	LBNDKA111WRP0	U	Capacitor holder	1	AD
	4-44	PSKR-A308WRF0	U	Rear barrier	1	AH
	4-45	LANGFA002URP0	U	Cavity support bracket	1	AG
	DOOR PARTS					
Δ	5- 1	CDORFS013URK0	U	Door panel assembly [R-963(SL)M, R-953(SL)M]	1	BN
Δ	5- 1	CDORFW015URK0	U	Door panel assembly [R-963(W)M]	1	BN
Δ	5- 1	CDORFW017URK0	U	Door panel assembly [R-953(W)M]	1	BN
	5-1-1	GCOVHA024URF0	U	Choke cover	1	AL
	5-1-2	DDORFA001URK0	U	Door panel	1	BH
Δ	5-1-3	GWAKPS020URR0	U	Door frame [R-963(SL)M, R-953(SL)M]	1	AT
Δ	5-1-3	GWAKPW031URF0	U	Door frame [R-963(W)M, R-953(W)M, R-953(W)M]	1	AT
	5-1-4	JHNDPK001URF0	U	Door handle [R-963(SL)M, R-953(SL)M]	1	AD
	5-1-4	JHNDPS001URT0	U	Door handle [R-963(W)M]	1	AD
	5-1-5	LSTPPA017URF0	U	Latch head	1	AG
Δ	5-1-6	MSPRTA197WREZ	U	Latch spring	1	AC

PARTS LIST

Note: The parts marked "Δ" may cause undue microwave exposure. / The parts marked "*" are used in voltage more than 250V. / "§" Mark: Spare parts delivery section

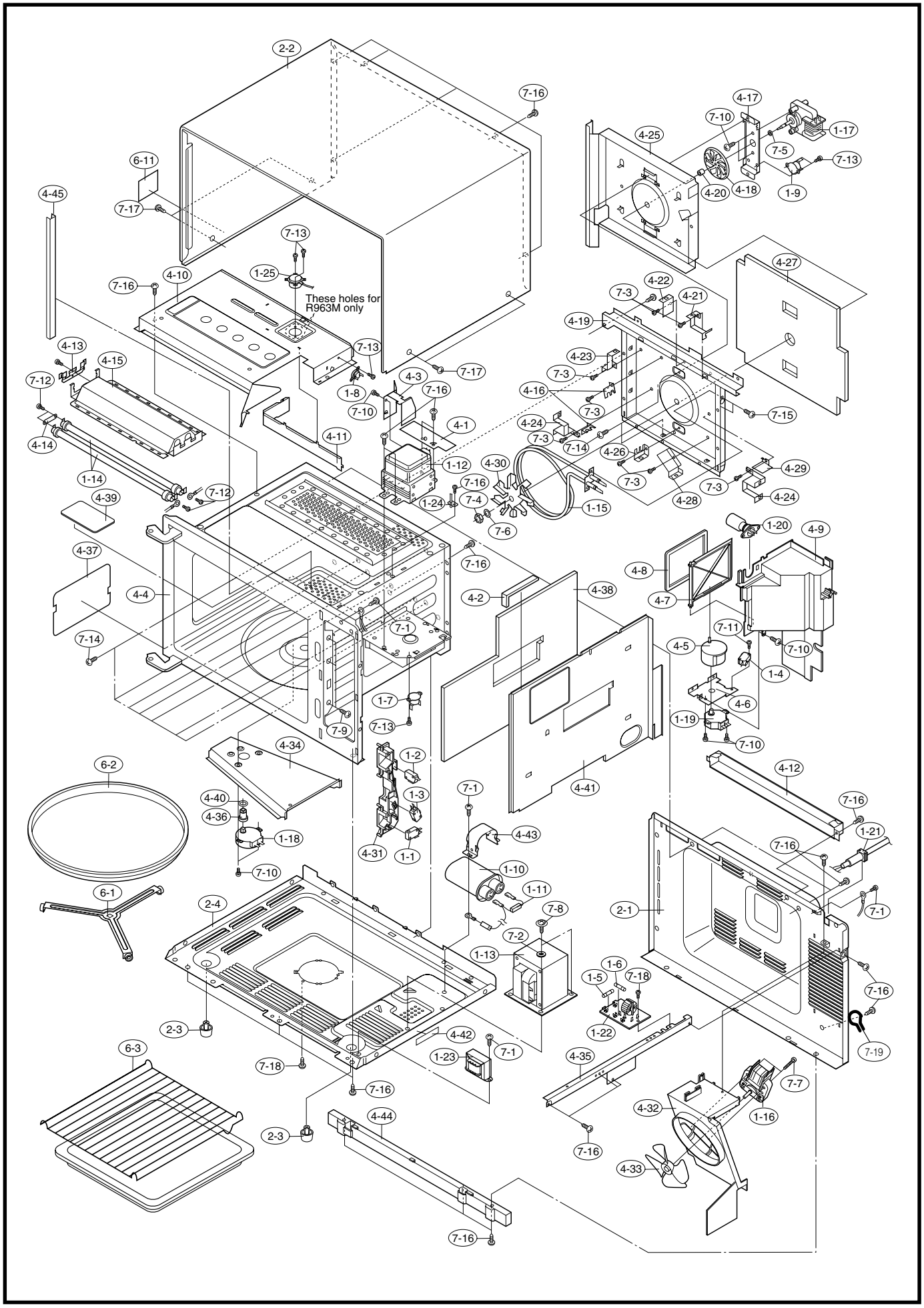
	REF. NO.	PART NO.	§	DESCRIPTION	Q'TY	CODE
	5-1-7	PGLSPA023URR0	U	Front door glass[R-963(SL)M,R-953(SL)M,R-953(W)M]	1	AW
	5-1-7	PGLSPA022URR0	U	Front door glass [R-963(W)M,	1	AW
	5-1-8	XEBSD30P06000	U	Screw : 3mm x 6mm	9	AA
	5- 2	LSTPPA018URF0	U	Door stopper	1	AB
				MISCELLANEOUS		
	6- 1	FROLPA060WRK0	U	Roller stay	1	AS
	6- 2	NTNT-A040WRE0	U	Turntable tray	1	AZ
	6- 3	FAMI-A003URK0	U	Square shelf	2	AQ
	6- 4	FAMI-A001URK0	U	High rack	1	AQ
	6- 5	FAMI-A002URK0	U	Low rack	1	AP
*	6- 6	TINS-A208URR0	U	Operation manual	1	AS
	6- 7	TCADCA011URR0	U	Cookery book	1	AX
	6- 8	FW-VZA073URE1	U	Main harness	1	AW
	6- 9	FW-VZA074URE0	U	Stop switch harness	1	AH
	6-10	QW-QZA001URE0	U	High voltage wire B	1	AE
	6-11	TCAUHA001WRR1	U	Caution label	1	AC
	6-12	TINS-A211URR0	U	Quick start guide	1	AM
				SCREWS,NUTS AND WASHERS		
	7- 1	XHPSD40P08K00	U	Screw: 4mm x 8mm	2	AA
	7- 2	XWWSD50-06000	J	Washer: 5mm x 0.6mm	1	AA
	7- 3	XCBWW30P06000	J	Screw: 3mm x 6mm	8	AB
	7- 4	XNEUW40-32000	J	Nut: 4mm x 3.2mm	1	AA
	7- 5	XRESE40-06000	U	Ring	1	AA
	7- 6	XWSUW40-10000	J	Washer: 4mm x 1.0mm	1	AA
	7- 7	XEPSD40P25000	J	Screw: 4mm x 25mm	2	AA
	7- 8	XFPSD50P10KS0	U	Screw: 5mm x 10mm	2	AB
	7- 9	XJPS040P10X00	J	Screw: 4mm x 12mm	2	AA
	7-10	XHPSD40P06000	J	Screw: 4mm x 6mm	8	AA
	7-11	XCPSD30P14000	J	Screw: 3mm x 15mm	1	AA
	7-12	XBPWW30P05K00	J	Screw: 3mm x 5mm	4	AA
	7-13	XEBSD30P06000	U	Screw: 3mm x 6mm [R-963(SL)M/(W)M]	6	AA
	7-13	XEBSD30P06000	U	Screw: 3mm x 6mm [R-953(SL)M/(W)M]	4	AA
	7-14	XOTWW40P06000	J	Screw: 4mm x 6mm	9	AA
	7-15	XHTWW40P08000	J	Screw: 4mm x 6mm	2	AA
	7-16	LX-CZA001URE0	U	Special screw	28	AA
	7-17	XOTSE40P10000	J	Screw: 4mm x 10mm	4	AA
	7-18	XHTSD40P08RV0		SCREW: 4mm x 8mm	4	AA
	7-19	LHLDKA008WRF0	U	P-clip	4	AA

HOW TO ORDER REPLACEMENT PARTS

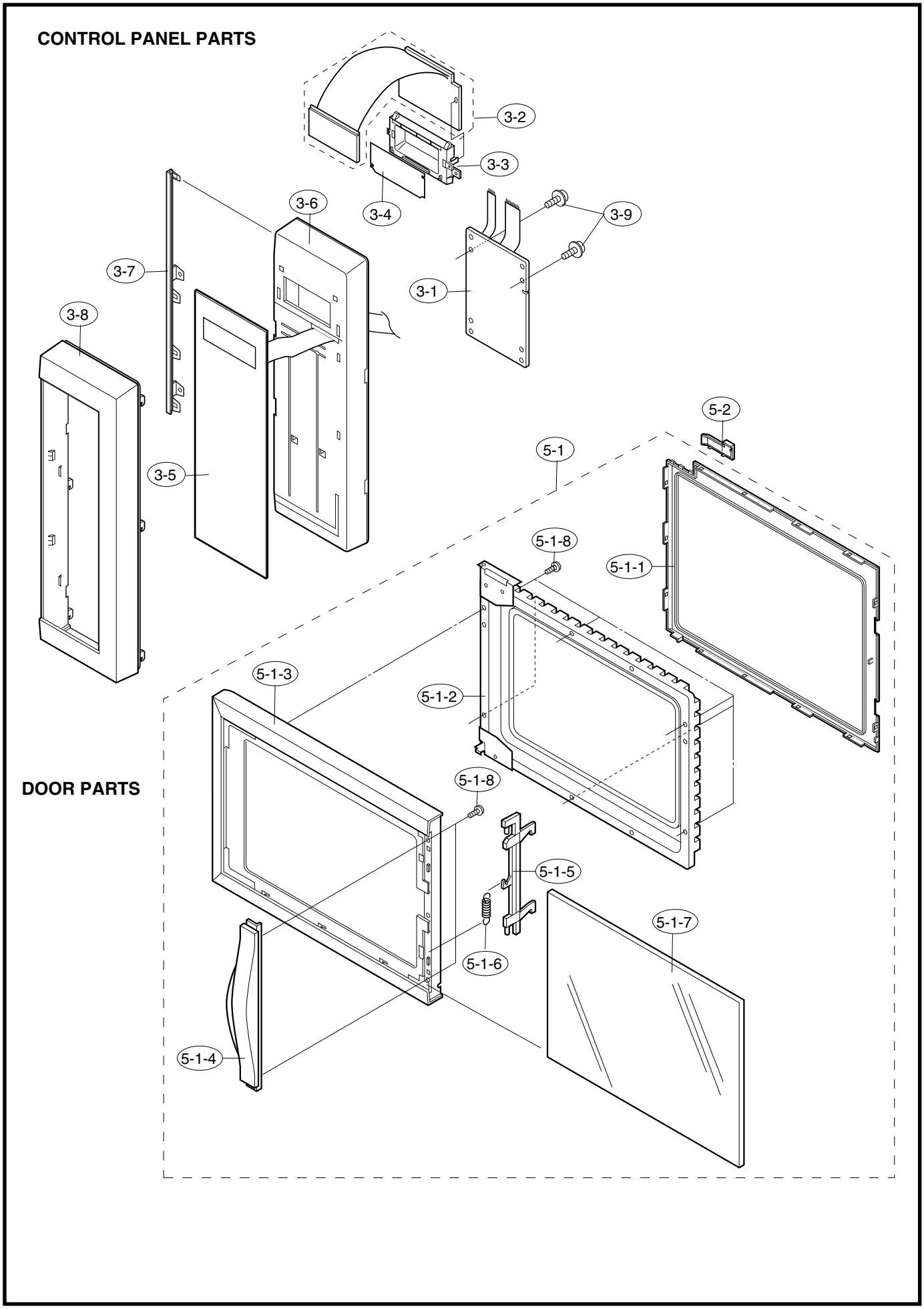
To have your order filled promptly and correctly, please furnish the following information.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

OVEN PARTS

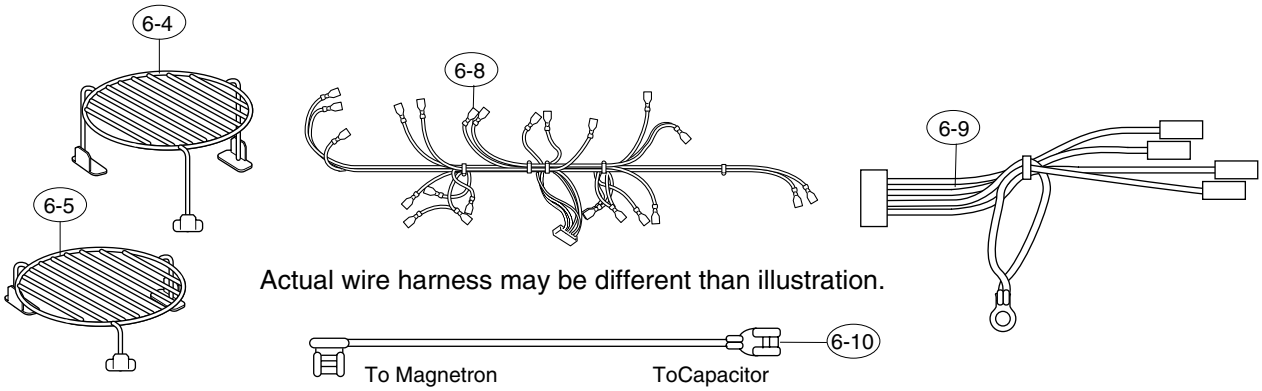


CONTROL PANEL / DOOR PARTS

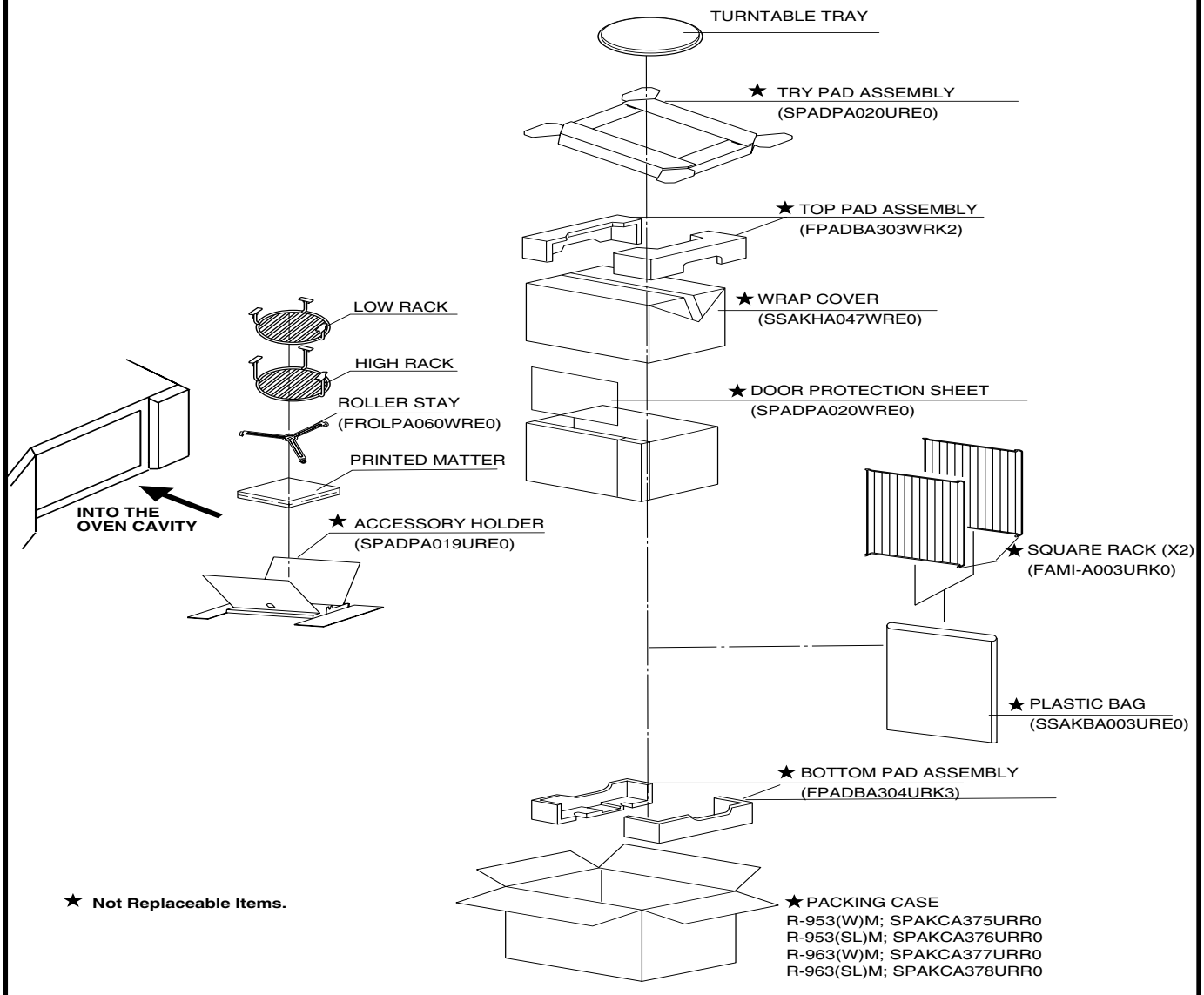


MISCELLANEOUS / PACKING & ACCESSORIES

MISCELLANEOUS



PACKING AND ACCESSORIES



★ **Not Replaceable Items.**

SHARP®

COPYRIGHT © 2000 BY SHARP CORPORATION
ALL RIGHT RESERVED.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission of the publisher.

2000 SHARP CORP. (6S1.31E) Printed in U.K.